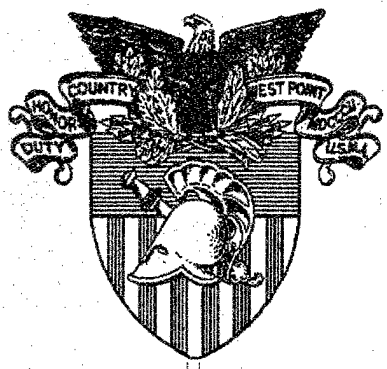

United States Military Academy
West Point, New York 10996

FORCE XXI: DIRECTIONS IN DIGITIZATION

Symposium Report

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THE ARMY IS IN THE MIDST OF SIGNIFICANT, FAR REACHING CHANGE AS IT APPROACHES THE 21st CENTURY. IN THE PERIOD FOLLOWING THE COLD WAR AND THE GULF WAR, AND FACED WITH SIGNIFICANTLY TIGHTER BUDGET CONSTRAINTS, THE ARMY HAS EMBARKED ON A PROCESS THAT WILL GUIDE ITS EVOLUTION INTO ARMY XXI. INITIALLY SPEARHEADED BY THE LOUISIANA MANEUVERS (LAM) TASK FORCE, THE PROCESS HAS FOCUSED ON CHANGING FROM AN INDUSTRIAL AGE TO AN INFORMATION AGE ARMY. CRITICAL TO THE SUCCESS OF THIS TRANSFORMATION IS DIGITALIZATION OF THE FORCE. DIGITIZATION WILL ULTIMATELY ENABLE THE ARMY TO MOVE AND SHAPE INFORMATION IN VOLUMES AND AT RATES UNPRECEDENTED IN THE HISTORY OF WARFARE. TECHNOLOGICAL BREAKTHROUGHS IN INFORMATION OPERATIONS WILL SUBSTANTIALLY IMPROVE THE QUALITY AND TIMELINESS OF DECISIONS MAKING AND ENHANCE THE OVERALL EFFECTIVENESS OF MILITARY SYSTEMS AND ORGANIZATIONS ON THE BATTLEFIELD.

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FORCE XXI: DIRECTIONS IN DIGITIZATION

Symposium Report

Major Michael J. Kwinn, Jr
Analyst, Operations Research Center

A TECHNICAL REPORT
OF THE
OPERATIONS RESEARCH CENTER
UNITED STATES MILITARY ACADEMY

Directed by
Lieutenant Colonel David W. Hutchison
Director, Operations Research Center

Approved by
Colonel James L. Kays, Ph.D.
Professor and Head, Department of Systems Engineering

21 August 1996

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Executive Summary

INTRODUCTION

The Army is in the midst of significant, far reaching change as it approaches the 21st Century. In the period following the Cold War and the Gulf War, and faced with significantly tighter budget constraints, the Army has embarked on a process that will guide its evolution into Army XXI. Initially spearheaded by the Louisiana Maneuvers (LAM) Task Force, the process has focused on changing from an industrial age to an information age Army.

Critical to the success of this transformation is digitization of the force. Digitization will ultimately enable the Army to move and shape information in volumes and at rates unprecedented in the history of warfare. Technological breakthroughs in information operations will substantially improve the quality and timeliness of decision making and enhance the overall effectiveness of military systems and organizations on the battlefield.

The rapid rates of change in information technology and the sweeping impacts of such change on organizations and how the Army fights wars will create an extraordinary array of challenges for force developers. The Army must determine the impact of digitizing the force on a myriad of interrelated areas that include training, leader development, doctrine, interoperability, transition, and readiness. This is further complicated by the efforts to simultaneously visualize an end state that will unite and focus its efforts to accommodate change. It may be necessary for a traditionally conservative Army to "think outside the box," take innovative, even radical, approaches to examine its critical processes that feed and produce the output necessary to meet the needs of the national strategy.

CURRENT SITUATION

Incremental gains towards this goal are seen daily. Task Force XXI at Fort Hood is fielding 100 new systems this year. Of those systems 37 are modernazations and 63 are prototype systems. The experiments include determining the effects of digitization on warfighting, command and control, and interoperability. AWEs assess the capabilities digitization brings to battle command and staff functions. The Prairie Warrior Exercise at Fort Leavenworth examined the impacts of digitization on, among other areas, battle command and control. TRADOC recently approved for distribution a METL for a digitized Army and is turning to the task of developing TTP (Tactics, Techniques, Procedures) for digitized forces. Software is being written to address interface and operability issues associated with transitioning to a digitized force.

In April 1996, the US Military Academy's Department of Systems Engineering and the Operations Research Center of Excellence continued its ongoing efforts to assist the Army's movement into the 21st century by jointly hosting a symposium entitled **Force XXI: Directions in Digitization**. The purpose of the symposium was to identify issues and possibly develop consensus on the future Army digitization efforts.

THE CHALLENGES

The Army is moving toward a digitized force across a broad front. Significant advances during recent years have established the US Army as the acknowledged leader in the joint arena. However, there remain an enormous array of challenges, any one of which could result in progress being delayed, or worse, being completely halted before the full transition is completed.

Participants in the Digitization Symposium discussed the challenges in seven major areas. In order of the group's preference, these were: Training, Leadership, How to Fight, Transition, Organization, Interoperability, and Readiness. Each of these challenges is discussed in more depth below. From the discussion it is clear the issues are closely interrelated making it extremely difficult to isolate one area without addressing another. Comments from the symposium will form the basis for future analysis of these issues.

1. Training

Our training programs must be standardized, flexible, and responsively accommodate change. We must standardize the programs to ensure that soldiers and leaders receive common training on similar equipment as they move to different units. The training programs must accommodate new software versions as they are fielded. We must be able (and willing) to change training programs much more quickly as tactics, techniques and procedures are developed, or when new threats are identified. Greater emphasis must be placed on each soldier remaining current. Periodic return to schools may prove insufficient to keep pace with the technology and resulting changes to warfighting.

Without restructuring and properly resourcing the training system, it will be difficult to make digitization work in practice. Current formal training programs are not sufficiently agile to keep up with rapidly changing technology. It may be necessary to redistribute the load and responsibilities for developing training programs. The reduced manning of organizations traditionally charged with this responsibility may require other organizations to contribute to this vital area.

2. Leadership

Leader Development must focus on fundamentals and principles that have lasting value in a rapidly changing technological environment. Leaders should be trained first in the "art of command" and the principles of war. Digitization is an enabler for command, not a substitute for it. Leaders must first be taught the principles of command, including visualization of the battlefield. The structured, linear thinking and procedures of the past may prove inadequate for the more fluid, nonlinear battlefield predicted for the information age. The challenge then is to link that visualization to more timely and accurate decision making by battle commanders.

The officer professional development system needs realignment with how we fight in a digitized Army. The current stove-piped, branch approach to developing officers needs to be reviewed and validated against future Army needs. The digitized Army will fight and man TOCs based on functional requirements. We should manage our officer system similarly.

This will be difficult to change, but digitization will allow it to happen. More importantly, downsizing may require it.

The Relevant Common Picture must be completely tailorable for the commander. Determining what a commander should view and what information should be available to a commander is a critical training issue. Tailorability would allow commanders to view the battle at any level in varying levels of detail and modes of presentation.

3. How to Fight

There will be an evolving synergy between changing technology and doctrine. Changing technology will ultimately change the way the Army fights, but doctrine must control the lengthy transition period toward a digitized force.

At the Task Force level the nature of warfighting will not change. However, tempo, uncertainty, and nonlinearity will increase An objective in digitizing a Task Force should be to convert the Deliberate Decision Making Process from a discrete to a continuous time event. Many of the steps of this process can be automated. At the same time, digitizing logistics and improved vision on the execution level should allow Company Team commanders to exercise more initiative and take advantage of situations as they arise. These changes will increase the tempo of the Task Force fight, but other impacts won't be completely known until we conduct more digitized operations.

Above Task Force level, coordination and the ability to shape the battlespace should improve dramatically. Operations such as JAAT missions should be much easier to coordinate and execute. Commanders will be able to see what adjacent units are doing. This will allow a much more coordinated and supporting effort. Again, the tempo will increase but the full impact of digitization is not completely known.

Logistics will play an even more critical role in how we fight as a digitized force. Logistics must be a living part of any evolution in doctrine.

4. Transition

Transition requires a (perhaps evolving) visualization of the end-state. The end-state will provide unity of effort and commonality of purpose as the Army transitions. A comprehensive, coordinated fielding plan consistent with the end state is needed.

Current paradigms and procedures for fielding new systems may be outdated for meeting Army needs during the transition to a digitized force. The manner in which we field digitized equipment is key. Strategies such as top down fielding, bottom up fielding, or hybrids may apply, depending on the system and/or unit(s) involved. Digitization will come about only through tremendous costs, and current, standard fielding procedures may not apply in all cases as the Army moves towards full digitization.

Fielding and training cycles and plans must be closely synchronized with programming and budgeting. Fielding by FY00 of the initial digitized division requires POM and budget decisions in the near term.

The fielding plan must address the readiness and deployability of the force being digitized. A "piecemeal" fielding approach employed in an effort to keep the entire Army

"fully ready" might fail, because it could extend the fielding process too long. Strategies must address fielding in integrated unit packages of components of the digitized battlefield.

5. Organization

The digitized force should offer opportunities to organize to take advantage of new technologies, better execute an evolving doctrine, and respond to a decreasing budget. It is highly unlikely that the Army can afford to simply integrate changing technologies into an organizational structure that was derived to serve outdated needs and situations far different than envisioned for the 21st Century. Digitization should allow efficiencies in command and control that enable organizational economies as well as improved warfighting.

The role of the staff in the digitized force needs to be studied. Over time, the Army should experience "flattening out," reduction of overhead and redundancies, streamlining of processes, and more productivity from budget dollars. The staff is a target for these efficiencies. A Task Force commander should be able to manage a greater number of units with the assistance of fewer staff members. At the brigade and above level, TOCs should be organized as information management centers that are functionally (e.g., operations, logistics, information) manned. We must be careful not to allow staff reductions get ahead of fielding of the equipment and software or the training associated with the fielding. Otherwise we will hamstring the commander.

6. Interoperability

The challenge is to achieve effectiveness with both digitized and non-digitized units operating together. TTP must be developed that enable non-digitized units to generate and use the common relative picture that represents the common situational awareness of digitized units. The transition from a non-digitized to a digitized force also presents challenges for interoperability. The Army must sustain its effectiveness as it modernizes.

Technology cannot fully solve interoperability problems, but it can help. Interoperability is achieved through common language, graphics, thought processes, and approaches to warfighting. Digitization must support these critical common links that achieve interoperability. Technology can improve the interoperability between digitized and less-digitized units.

7. Readiness

Digitized equipment may initially degrade readiness until full employment training is complete but it should improve out overall preparedness for conflicts. All new equipment fielding will be no different. This measure of readiness will improve with time. Digitization will allow a unit to conduct simulation exercises on the terrain in which they might fight. They will also be able to remotely interact with other units with which they will be deployed.

Force XXI: Directions in Digitization

We must remember that we are already in transition...This is not coming from a standing start. It's like jumping on a moving train and running forward to take over the engine room.

Anonymous comment captured as computer input during the **Force XXI: Directions in Digitization** symposium, 22 April 1996 [D-4-1]

1.0 Introduction

There are few who will disagree that the Army's transition to digitization is like a fast moving train. Nearly every Army battle lab and research center in the Army is working on some aspect of the Force XXI digitization effort. Whereas almost every day there is a new development, the entire digitization effort has stayed on one track and is careening forward - at breakneck speed!

1.1 Background

During recent months, Task Force XXI at Fort Hood has been installing digitized equipment that will soon make some Army units "fully digitized". The Training and Doctrine Command (TRADOC) has conducted Advanced Warfighter Experiments (AWEs) to assess the changes that digitization will bring to battle command and battle staffs. Another assessment of digitization technology was recently conducted during Exercise Prairie Warrior at Fort Leavenworth. A study group for TRADOC has developed a Mission Essential Task List (METL) for the new digitized Army. This group is currently briefing general officers from

around the Army on their findings and recommendations. The TRADOC Commander, General Hartzog, has approved this METL for distribution.

1.2 Focusing on the Direction

The Department of Systems Engineering and the Operations Research Center of Excellence (ORCEN) at the United States Military Academy, West Point, New York are among the many research facilities assisting in the Force XXI digitization effort. Faculty and analysts have worked related issues such as Force XXI Division Design, the value of information, information flow in a digitized Battle Command Post, and provided an overall assessment of the entire Force XXI process. Clients include the Army Digitization Office, Training and Doctrine Command (TRADOC), TRADOC Analysis Center (TRAC), and various Battle Labs throughout the Army. The TRADOC Battle Lab Integration, Technology and Concepts Directorate (BLITCD), suggested we hold a symposium to assess the Army's current status on digitization. This symposium, entitled **Force XXI: Directions in Digitization**, was conducted by the Department of Systems Engineering and the ORCEN on 22 April 1996 at West Point.

A diverse group of highly regarded experts were invited to attend including both military and civilian personnel involved in the entire spectrum of the digitization effort. A list of invitees, is provided at Annex A. The purpose of this symposium was to share information and opinions, to identify consensus where it may exist, and to consolidate issues and directions. We wanted to make the symposium as useful as possible for invitees so we solicited their input on the issues we addressed prior to the symposium. The symposium agenda reflects the input we received ahead of time from the attendees.

During working sessions, the group addressed on seven issues relating to Force XXI and digitization[1]. In the morning session, the participants made general comments on each issue. In the afternoon, the general comments were categorized and rank ordered based on their relative importance to the group. The top three issues were then discussed in more detail.

This report begins with a synopsis of the opening remarks by COL James L. Kays, MG Joe W. Rigby and BG(P) David L. Ohle that set the stage for the discussions that followed. A complete transcript of their remarks is at Annex B and slides are given in Annex C. We then breakdown each of the seven issue areas in the order the participants ranked their significance: Training, Leadership, How to Fight, Transition, Organization, Interoperability and Readiness. The comments which the participants input at the workstations is at Annex D. A transcript of their verbal comments made during the actual working sessions is at Annex E. Throughout the report, when we reference a comment, either verbal or input at the workstation, we reference the source page of the comment. Finally, we address which areas should be researched further and conclude by covering the closing comments from the symposium (transcripts and slides are at Annexes F and G, receptively.)

[1] The group commented on each of these issues using GroupSystems for Windows® software. During the symposium, each participant sat at a workstation and made comments via computer entry. The software compiled these comments and displayed them to the group without identifying the author of the comment. Since we had number of subject-matter experts present, participants in this symposium also provided verbal comments. In the report, we incorporated the anonymous comments obtained from computer input and verbal comments captured on video tape.

2.0 Opening Remarks

2.1 Symposium Host's Remarks

Colonel James L. Kays welcomed the participants to the department and to West Point. He quickly focused on the purpose of the symposium. "...The main purpose [of the symposium] is to serve your needs...if there is a question in your mind that you want addressed, if we don't get to it today it's your fault." [B-1] He explained that the proceedings would be very open so that we address the issues important to the participants. The symposium was not designed to be a series of presentations. Rather, it was to be "...a working session. Not a lot of fancy glitz...There will be oral discussion, as well as use of the GroupSystems [software]." [B-2] He then introduced MG Joe Rigby, Director, Army Digitization Office, and BG(P) David Ohle, Deputy Commandant, Command and General Staff College. He asked them to provide opening remarks for the symposium. They focused on their organization's role and view of the status of the Army's digitization effort thus far.

2.2 Major General Rigby's Remarks

MG Rigby began by presenting breakdown of the focus of the Army Digitization Office (ADO). He gave the group a "snapshot in time of where we are on the digitization axis...[and] most of my issues in the ADO axis focus on transition issues and interoperability issues." [B-2] He detailed the three architectures in digitization development: operational, systems and technical. He also emphasized that "the Army's total effort on digitizing the battlefield is part of an overall joint effort." [B-3]. It is imperative that the architectures explained above are not common for the Army, but for all of DOD as well. He believes that this "is the central issue of

interoperability." [B-3] They are addressing the interoperability between NATO nations through the use of "translator boxes".

He then explained how the digital equipment fielding was going at Fort Hood with the EXFOR. Most every asset in the Task Force is committed to this transition effort with "over 100 equipment related fieldings going on right now, to include 37 brand new systems...All of those require some kind of integration...and the equipment training for the soldiers. And that's overlaid on the division's normal training exercises as part of the corps." [B-4] This is a massive undertaking which will eventually occur at most every post in the Army and to most every unit. Later in the day, the group discussed how to handle this.

Brigadier General Ohle's Remarks

BG(P) Ohle then presented his views from his recently appointed "proponency for all command and control in the whole Army." [B-6] The focus on his presentation was Battle Command and how we will develop that in the Army. His remarks became the start point for many of the discussions in the working session on Training, Leadership and How to Fight. He also asked COL Steve Baribeau, Director, TRADOC Program Integration Office (TPIO), to explain how the Army Battle Command System (ABCS) will improve our ability to Battle Command in the Army. BG(P) Ohle's and COL Baribeau's remarks focused around three themes: "Number one, the doctrine, 100-5, Number two, these new patterns of operations...and number three, how we are structured at Leavenworth and at TRADOC and in the Army to handle Battle Command." [B-7,8]

3.0 Issue Analysis

In this section we analyze individually each of the topics on which the group commented. The majority of the issues and recommended solutions are based on a consensus opinion developed from the participants comments. The comments the participants made during the symposium are the basis of this report, but we did not rely solely on this source in our analysis. We will identify the issues and proposed solution which we developed based on our insights and knowledge of the Army's digitization efforts.

3.1 Training

. Most of the comments made on Training and Leadership topics were closely related. The two topics are clearly intertwined. They are also keys to the success of the Army and of digitization. Most of the leader-specific training issues are presented in the next section on Leadership. In this section, we present basic properties our training programs should have, how we should develop those programs, and how to implement them.

3.1.1 Training Programs

"Our formal [training programs] are simply not agile enough to rapidly evolve." [D-1-1] The challenge is to **standardize our training programs** while **making them flexible** enough to handle the rapid changes in the software and equipment and **reduce the time to change** our formal training programs. The bottom line is: "[Without] restructuring our training systems, we will unlikely make digitization work in practice." [D-1-1]

We need to standardize the training our soldier and leaders receive at the different installations. This does not mean that TRADOC will tell a commander *how* to train his unit. We

ensure this by changing our fielding strategy. We should ensure that soldiers and leaders are training on the same equipment while at different installations. "Let's do it the same rather than ver[sion] 1 at Ft Stewart, ver[sion] 1.1 at Fort Hood, etc." [D-1-1] We should apply this attitude to hardware fielding, too. We will not be able to affect the training of arrivals to a digitized unit from a non-digitized unit. We *can* mitigate the problems of arrivals from a digitized unit to another digitized unit, however. COL Tim Hoffman, a former Battalion Commander and current member of the OPMS XXI Precursor Study Group, agrees: "... common training requires that the guys in the non-digitized units number one understand the systems they are going to be operating so that the assembly time goes down. They have to know how to use them. They have to know what capabilities that they bring. They have to be able to talk the same language." [E-1]

Technology will continue to move at a rapid pace and our formal training program must be flexible enough to handle that rate of change. To do this, our programs should concentrate on the fundamental skills digitization will require of our soldiers and leaders. As one symposium participant put it: "We will always be chasing technology. As soon as we get a 'version' of software or hardware, it is obsolete...it is going to require an officer/NCO corps with enough requisite background to adapt." [D-1-1] We cannot change our formal training programs with each software version. We also cannot teach soldiers outdated information using outdated equipment. One solution offered was "...to be willing to miss an upgrade in order to field capabilities and train to standard with those capabilities. If we try and field the latest and greatest we will never field anything, much less train with it." [D-1-1] We *should* try and field the latest and greatest - once we can train to the new standard. We want to have as much capability in the

field as digitization allows us. At the same time, we cannot afford to have the digitization be a hindrance because we cannot keep our people trained.

We have to reduce the time it takes to change our formal training programs. It only took a couple of years for schools to change from the Soviet-threat tactics to other threats around the world. The world situation and our own capabilities will change much more quickly in the future. "...TTP and doctrine will change/evolve more rapidly in the future and our current institutional structure just won't be able to keep pace...Here I think it is important to distinguish between the long term educational needs of the leader and the Army's short term training needs." [D-1-8] Unless we reduce our training development time significantly, we cannot ever hope to maintain pace with changes in the Army and digitization. There are many obstacles to reducing the time spent on this, not the least of which is the manpower issue.

3.1.2 Training Program Development.

We need to look at training program development and how to reduce the time it takes to develop a new program. **This will require us to analyze who develops the training programs.** "[Training] development is a problem for TRADOC. They do not have the resources to develop [training] packages for every level of the [organization]. So TRADOC must consolidate the TD functions at the Hubs or Clusters for economy of resources." [D-1-5] TRADOC could decentralize the actual development, but they must retain the ability to ensure commonality. The group recommended utilizing academic institutions like West Point and CGSC to perform this function. There is where much of the expertise lies, not necessarily with the individuals at TRADOC or even with contractors.

The Army and the threat are changing so rapidly that **doctrine and training programs must be written by "greensuiters"** and not by contractors, even if these contractors were formerly in the military. Though TRADOC is responsible overall for approving and fielding the training programs, "current TTP and MTP [are] written by contractors who have a focus of what was done when they were in the Army..." [D-1-4] The group concluded that in a rapidly changing Army,"[w]e need to get out of the habit of subcontracting out to industry our doctrine/modeling efforts...it may not serve the greater need of the Army." [D-1-5] "It has to be done by someone who is green, and takes a holistic approach to the problem. I could envision a doctrine writing group at Leavenworth doing it for the whole Army, with inputs from the schools." [D-1-4] Putting the burden of all doctrine and TTP development on greensuiters is a difficult decision. "This is a hard question that we are dealing with right now. Not enough folks to do the job. But this is a transition period and hopefully will sort itself out over time with good emphasis from TRADOC." [D-1-5]

3.1.3 Implementing the Training Programs

Although TRADOC is responsible for training development, much of the training in the Army is done at the unit or installation level. The question for unit commanders is how to implement a training program to support digitized operations. The following comment from the symposium identifies a possible solution:

> Bring together 5-7 systems at a given echelon. Train operators in each system (indiv'l training). Train staff officers/operators how each system interacts/ supports/feeds/etc all other systems (horiz integration). Train cdr and staff how to maximize system capabilities as they support planning, prepar[ation] for, and executing military ops (collective activity training-battle command execution). Throw in networking, new communications structures, contingency operations,

fewer resources, simulations, etc. and you have a very complex set of training issues that demand a "new" approach to digital training. [D-1-1,2]

The pace of change in the world political landscape, technology and doctrine is ever increasing. **We cannot wait to update our leaders in the field until they return to a school like the Advanced Course, Command and General Staff College or the War College. We must begin to educate our leadership on these changes while they are in field assignments.** Technology may provide us with the means to reduce the time it takes to get new education to the field: "This is a great opportunity for distance learning, simulations, CD-ROM packages and the like. Maybe we could create courses on the Internet to keep officers and NCOs current—in a self paced program..." [D-1-2] This is not a revolutionary idea. Industry is doing this now.

3.2 Leadership

"If we digitize our systems, but not our leadership corps, we have failed. This is new and 'hard' stuff." [D-1-6] In this section we address how we should develop our leadership, how we should organize and manage our leadership corps, and how we should develop the digital equipment to optimize our effectiveness in a digitized Army.

3.2.1 Leader Development and Leader Training

Regardless of how much science and technology we give to leaders, there will always be an art to war and an art to commanding. The *art* of command will stay the same. The *science* part only speeds up operations. **We need to continue to concentrate our leader development strategies on training leaders about the basic principles of war and decision making under uncertainty.**

"The principles of war will not change. The decision cycle will not change. How we enable the commander will." [D-1-8] If we concentrate our leader training on the principles of war, digitization should greatly improve the ability to apply them. "Technology is a force multiplier. [We] need to train commanders on what they need first--the art of war--and then how the technology can be used to give them the information they need to make intelligent decisions." [D-2-1] LTC Greer said "[Digitization] provides some information about the battlefield which is entirely different than seeing the battlefield...Seeing it, visualizing it, understanding it that's what's important. [E-12] The gift of leaders like Napoleon and Patton were not their ability to *obtain* information. Their gift was in using the information they had to *understand* the enemy and its objectives - and then acting! This is what we need to train our leaders to do.

We may change our tactics but there will always be the requirement to make decisions under uncertainty. Commanders must still make the decisions based on their experience and their training. Training leaders how to react in this compressed time schedule is the challenge. Digitization will provide leaders with most of the information they need. Some of that information will be out-dated, some will be tainted or exaggerated, some may even be corrupted by the enemy. "Clausewitz had it right. The fog of war will always exist. To believe that digitization will eliminate the uncertainty of the battlefield is naive. Instead, we need train commanders to operate in uncertain environments." [D-1-7]

3.2.2 Branches versus Multifunctional Career Patterns

There is a Officer Personnel Management System (OPMS) XXI Precursor Study Group

tasked to develop a officer development system which will support the digitized Army. One solution offered in the symposium is to **move to away from a "branch-oriented system" to a multifunctional career pattern**. There are many who believe that if you

> "[d]o a functional decomposition of command and control for military operations ... you will find that you need to accomplish 3 major functions: battle command, logistics, and information operations. Most of our current branches can be grouped around these 3 functional areas in a very natural and logical manner. The C2 organizations need to be reorganized around these 3 functions." [D-2-1]

While the Director of the Operations Research Center, LTC Michael McGinnis began work on a officer personnel system which more closely follows the functional requirements of officer roles in combat[2]. This work in progress provides the rationale for such a multifunctional career pattern. At the symposium, he provided some of the rationale behind his proposals:

> I think...that maybe the time has come to develop a battle command track. That ... at certain points in their careers certain types of people, they have that knack, they have demonstrated that ability [to command]. You give them those opportunities to experience that battle command environment without putting themselves, their forces or their equipment at risk, so that when that battle commander assumes command, he or she is ready to go tomorrow, the flag is passed they are ready to go. [E-8]

Another comment supporting this concept from the symposium was: "Eventually downsizing will force us into multi-functionality and elimination of branches...We are moving slowly in this direction, but proponents are fighting it every step of the way." [D-2-1] The logistics community is leading the way in this functional realignment. They recently unveiled Multifunctional Logistics (Functional Area 90) as a career choice for all logistics-based branch officers. This is the model for all other branches to evolve to. The first step may be in the way we teach our leaders: "Maybe its time we get away from branch schools and start to examine

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[2] McGinnis, Michael, George Hull, Michael Barbero, and Dominic Caraccilo. "Reengineering the Officer Professional Development System for the 21st Century." Operations Research Center Technical Report 95-6, TBP.

functional schools such as logistics, intelligence, and operations schools w/a capstone command and control course in which all branches related to that functional area attend." [D-1-5]

A multi-functional career pattern is a controversial option because it is a radical departure from the existing branch structure of the Army. There was some consensus in the group for this type of change but also reservation about the ability to change: "Wow - Hit the nail on the head!!! Lets step out of the box for a minute and examine what we really need. We have always been empire builders!!! (FA, ADA, INTEL, etc.). So who wants to lose some of their empire to a different overall organization. 'Not on my watch.' One of the biggest issues is to nudge some of the leadership to consider these issues." [D-2-1] COL Hoffman identified one of the arguments against multi-functional career patterns:

> I would argue that that is a very intuitively appealing view of the world. If all the Army consisted of was warfighters, then I would say let's go for it...Part of our problem right now is developing an officer corps with a full range of capabilities that run across the entire spectrum of skills that we need in the Army. A fundamental recognition that we came to... is that there is a real symbiosis between the TDA world and the TOE world. The TOE world feeds the TDA world which in turn feeds back into the TOE world again. You can't run the TDA world without warriors over there and vice versa. So you have to have enough of those kinds of guys who can go back and forth and fill the Army's need...you have got to have a system that takes your guys back and forth. [E-9]

A new multifunctional career pattern would still allow officers to go between TOE and TDA organizations to work in branch-immaterial assignments. Only now they would be *function*-immaterial assignments. Just because an officer is an INFORMATION SYSTEMS functional officer in a TOE unit does not mean that he or she cannot be a analyst in TRADOC. A BATTLE COMMAND functional officer could rotate to an instructor at CGSC, for example.

3.2.3 Relevant Common Picture and the Micromanager

"Information is the key to the future...We have got to have the systems that enable you to share information, but unless we make this information tailorable to the commander, we are going to be stuck." [E-10] BG(P) Ohle made this comment about how we manage to get a Relevant Common Picture (RCP) to each level of command. Some people are uncomfortable with giving a commander this much information. We believe that **it is not the analyst's nor the computer programmer's job to dictate what a commander should or should not see.** There are two issues: the development of the Commander's Critical Information Requirements (CCIR) and micromanagement on the battlefield.

Many argue that too much information can be as paralyzing as too little. We can solve these problems with technology. "Easy fix - software can be designed to support doctrinally what we want our commanders to do!!" [D-2-2] This statement contends that an analyst should determine ahead of time the correct CCIR for a commander. LTC Michael McGinnis conducted research to try and develop a common basis for what commanders needed. He had some analysts administer questionnaires to senior commanders, including some division and corps commanders. The analysts asked these commanders to list what were their CCIR.

> We got about 200 different pieces of critical information. We then mapped [them], and even though different words are used to describe the same thing, it turns out that a lot of these things are common...But what you want to do regardless of how much commonality there is, you want to still allow the commander to tailor all that...ahead of time so that when the commander walks in they can build [the RCP] in a way that is very intuitive to them...[E-8,9]

Many in the symposium agreed with this solution. Each commander is different and "should be able to tailor his screen for what he needs to develop his picture. Therefore, we

should not focus on the RCP but more on training the commanders how to tailor the available data to meet his mental needs." [D-2-3]. This is a training issue and through training, a commander develops what he feels he needs to make the right decision.

The other issue raised with a tailorable RCP is micromanagement. Again, some offer a technological solution. "We need to be careful that commanders only are presented with the information that they need to make THEIR DECISIONS!" [D-2-3] COL Baribeau, believes that "[a] division commander could in fact go to the database of the battalion. Sure, and there is nothing to prevent him from doing so. The question is, why in the devil would he want to do that?" [E-12] MG Rigby observed that "if [a commander] has got the time to do that, then he is not doing anything!" [E-13] There may be times when it is appropriate that a commander drop down into a subordinate unit's fight and track the battle from there. "If micro-management is the best approach based on METT-T at that time, so be it. What Div Cdr would deliberately allow something bad to happen he could fix?" [D-2-2] Again, this is a training issue. "Granted a division commander can become a squad leader (always have been always will be some percentage of micro-managers) the solution resides not in system controls but in discipline through professional development and training." [D-2-4] "This is a doctrine and leadership issue...Perhaps the BCTP teams could be instrumental in helping senior commanders focus on their level of the battle and intervening where appropriate. Interpreting commander's intent and acting appropriately is a training issue..." [D-1-3]

3.3 How to Fight

There is a great disagreement during the symposium as to whether doctrine drives technology changes or vice versa. That is not the real How to fight issue. We have new technology. We have developed new doctrine. We need a coordinated experimentation effort to determine how we should develop our technology to support our doctrinal changes. In this section we address how digitization could effect Task Force operations and how it could effect operations at brigade and above.

There was consensus that the pace of the battles will increase dramatically with a digitized force. In an environment of nearly perfect situational information, fewer hasty attacks and potentially no movements to contact need occur. This is a dramatic change at all levels of conflict. We believe that in order to capitalize on the increased tempo **at the Task Force level, we should use digitization to compress the planning cycle. Above the Task Force level, the greater coordination and situational awareness will result in more proactive operations.** These effects are far from a guarentee. There is a great deal that we do not know until we field a "fully diogitized" force on a battlefield.

3.3.1 Task Force Operations and Decision Making

"We must remained focused on the fundamentals--closing with and destroying the enemy. The basics remain the same, firing and maneuvering; closing with and destroying the enemy. What is going to change is the way decision making is made on the battlefield and the ways those decisions are passed to shooters." [D-3-2] MAJ Agoglia agreed with this comment when he said: "give me a tank and with what I have I can do a pretty good job of getting information to the people I need to ... doing what I need to do." [E-4] This role at the Task Force level will never change. The efficiencies will change as will the ability of a staff (or just a commander) to work through the steps of the Deliberate Decision Making Process with the help of technology. Some offer that "[t]he Deliberate Decision Making Process as we know it will no

longer exist." [D-3-1] Though possibly different in appearance or format, the basic character of the process will continue to exist. We believe that **the objective of the digitization effort should be to make the Deliberate Decision Making Process a continuous-time event instead of a discrete-time event.**

A well-publicized chess match between an IBM computer, "Deep Blue," and International Grand Master Garry Kasparov, the reigning world chess champion yielded some interesting results. Deep Blue plays chess by "thinking" about opponents strategies and counter-strategies based on the previous moves by the opponent. Although Deep Blue eventually lost the match, the computer made its moves within seconds whereas Kasparov took as much as an hour. The issue is not that computers can out-think a person. "Deep Blue is a computer that plays chess. It will never be a chess player."[3] The issue is computers as aids to command.

We are taught that a good decision executed quickly is better than a perfect decision executed too late. The human element can never be taken out of the loop in commanding a unit. Command still remains an art much more than a science. Nonetheless, we are developing the technology to automate many of the steps of the Deliberate Decision Making Process. As we decrease the time it takes to complete the Deliberate Decision Making Process, we decrease the time it takes for a Task Force to initiate movement and execute a mission. How much will this increased tempo change Task Force operations? As BG Ohle says, we will have to see what the experimentation shows us because, "we don't know what we don't know." [E-5] But when asked whether he thinks digitization will change the way a Task Force fights, he responded,

> It is my opinion that it will change...I am concerned that too may people assume that it won't change. I think that it is going to fundamentally change and we have

[3] IBM Deep Blue web page.

got to be prepared to change the structures and the procurement of other systems based on how well digitization works. [E-5]

3.3.2 Digitization and Operations above Task Force Level

The consensus of symposium participants was that **operations above the Task Force level will change dramatically. Most expect a more offensively-minded "attack" orientation due to greater battlefield awareness**. For example, in Air Defense operations, "[t]he combination of GBS, FAADC2I, and AVENGER will significantly change ADA doctrine from reactive to proactive." [D-3-6] This proactive nature will be prevalent in most every branch and operation. The same reactive-to-proactive realignment occurred in the Field Artillery when they digitized.

The relevant common picture will allow lateral coordination between digitized units to improve. As a result, the pace of operations will increase dramatically at higher echelons. Forces will engage sooner, the fights will be briefer, and overwhelming force will be the norm. Real-time operations and continuous-time planning will require greater coordination. Doctrine experts foresee increases in the number and lethality of deep fire power systems as we are better able to pinpoint enemy targets and coordinate JAAT missions.

There are still many questions about what changes may take place. Significant issues remain concerning the configuration and capabilities needed for a brigade or above staff in order to deliver the promises of digitization. More study is needed to determine to proper balance of direct-contact forces versus long range firepower and delivery assets. These questions will be resolved over time.

3.4 Transition

While not as glamorous as training, leading, and fighting the force, transition is a very important topic, MG Rigby believes that transition is a *very* important topic: "This fielding issue is one that the Army hasn't put its finger on yet but it is probably the most fundamental issue in the whole thing." [E-3] **A poorly structured transition strategy could lead to a less effective, less efficient Army than we envision.** Moreover, the costs to fix the system once improperly emplaced could be very high.

Previous sections have tried to address how the Army will train, lead, and fight differently as a digitized force. This section looks at the problems associated with the transition from today's force to the modernized digital force. First, we address the *order* we should field units in light of digitized operations and possible budget cuts. Second, we address the *manner* we should field them to maintain a ready force.

3.4.1 Organizing Digital Equipment Fielding

The fielding of equipment in the Army has traditionally been done in a stair-step fashion. Normally we try to field different units with new equipment to reduce the amount of turmoil in a particular unit. This is done primarily to maintain unit readiness. MG Rigby continued his comments on the equipment fielding by questioning this system: "If you look at the Army modernization fielding right now, it is disconnected. And somehow it has to be brought together in a way that...tries to optimize command and control, that puts the sensor to shooter best fix on the battlefield within the resources. We've got to go back and re-look this whole fielding issue." [E-4] There was considerable agreement on this point. **We have to decide at which echelon to**

field the equipment so that both short and long term effectiveness of the force are optimized. There appear to be no clear cut answers. Quite a few competing proposals have merit. One critical factor that must be considered in our analysis is that **whatever fielding strategy is chosen must be based on the likelihood that funding for the effort might end.**

MAJ McFadden proposed "a possible strategy would be to...field the corps and...divisions first so that you get the interoperability among the Army's top organizations at the tactical level and then start filtering down to the systems down to the brigade and battalion." [E-2] MAJ Agoglia agreed, but from a different stand point than interoperability. He believes that "with what I have I can do a pretty good job" but would like the higher headquarters to have the equipment so [the tactical commander] is "protected against theater ballistic missiles...[and] against chemical and biological agents." [E-4] COL Baribeau, who is responsible for the fielding of the Army Battle Command System, a significant component of the digitized force, has looked at this issue and believes that some systems should be fielded at the corps level and then work down while others should be fielded at the battalion level and work up. "If you don't have artillery at the corps, the end to end shooter doesn't work. So you have got to field artillery top down...I'd say maneuver control would be an example of where it would be probably better to give the battalion commander that power and build up." [E-4] COL (Ret) Semmens looks at it much differently. In his scheme, information warfare is all about "sensor to shooter - getting steel on target...[T]he TOC is not important, the information is what's important...and you got to take that stuff and pump it out to the guys who need it." [E-2] This would imply fielding some equipment at the lowest level first to bring the "shooter" into the loop. It also implies that we

need to develop our systems to link the top level with the bottom level with fewer in-between levels.

One of the most insightful comments on the topic was: "We need to field specific units or specific levels. We cannot start some systems from the top and some from the bottom. *If we run out of money we do not have anything worthwhile.*" [Emphasis added] [D-4-2] This is an insightful and sobering comment. When COL Baribeau mentioned that various Army and corps headquarters had asked to be fielded early with experimental digitized TOCs, MG Rigby responded with: "I really think we have to control that appetite until we know what we are doing because I can tell you that resources are very, very scarce right now. The Army may take another big whack here in the not too distant future." [E-4] COL Baribeau is right when he says that it is logical to field some systems from the top-down and others from the bottom-up. The problem is money. COL (Ret) Semmens comment sums up the concern: "[T]his stuff is...big time expensive...and I don't want the Army to say to hell with it, this stuff is too expensive and [say] we have got great tanks; we'll put in a few corps and division TOCs and call it a day." [E-5] A fielding plan that accounts for incremental changes in the budget is an imperative. If we field some systems from the top-down and others bottom-up, then our strategy must account for and withstand reduced funding without leaving capability gaps through the middle.

3.4.2 Keeping the Force Ready

Along with funding problems, any fielding plan must address the readiness of the Army as a whole as we transition to digitization. Digitizing an entire unit is a difficult and time-consuming process. Any unit receiving digitized equipment will experience a long lag time

between when they begin fielding and when they are fully mission-capable to conduct digitized operations. After receiving the new equipment, there are periods for orientation, individual training, collective training, and finally validation. There are two very distinct opinions on the readiness of our forces when we transition to digitization. As with many issues where opinions diverge so distinctly, the answer comes somewhere in the middle.

Some believe that we should be willing to accept a drop in readiness status to field the equipment correctly. "We have to be willing to C5 units to get them trained and transitioned as we digitize what we can of the remaining force structure (active and reserve). We cannot allow the [warfighter] mentality to hamstring our efforts. The readiness requirement, no matter how noble, only makes a hard job harder." [D-4-1] This is a bold statement when you think about how long it will take to get a digitized unit ready. If the Army fielded one battalion at the same time, it would likely have to stand that battalion down for three to six months. For a brigade, that could slip to nine or twelve months. We might have to stand down an entire division for one to two years! This means that we will not have a portion of our force available in any meaningful capacity. With the force reductions the Army has faced in recent years, and particularly the budgetary fights over readiness, dropping a portion of the remaining force would be difficult to defend.

Others hold that we must maintain readiness throughout the transition period. "The business of the Army is readiness to provide effective forces to the warfighting CINCs. Our transition (with only ten divisions, roughly four of which are committed everyday) must ensure we do not break readiness." [D-4-1] This almost assuredly would translate to a piecemeal fielding approach, and would likely extend the fielding for many years. Only then could the unit

train to with the full capabilities digitization provides. Until that time units would not be able to fully execute the digitized TTP and doctrine. In the meantime, we are paying for systems that are not providing a return on investment for many years. All of this does not consider the loss of funding, either.

Our proposed solution is a compromise between the two opinions. We certainly cannot afford to stand down units in the 2nd Infantry Division to field the entire digitization package. **When we field digitized equipment to Korea, or even to the divisions in Germany, we must field and train in pieces**. This will extend the effort but there is no way we can drop the readiness of units in either of these regions. We may be able **stand down a CONUS-based brigade, or even an entire division, for digitized equipment fielding.** We are doing that now with the EXFOR. We should know more about the timeline for the various units to become full mission-capable when the Division XXI experiment concludes. This addresses the readiness issue. It may be simplistic to believe that we can stand down even a CONUS-based brigade or division. This is a top-level decision but one that must be made. COL Baribeau submitted a fielding plan to DA that would adjust the DAMPL for a commander because "[the unit] is going to have a major training activity that is going to impact on [its] readiness significantly." [E-3] This is a step in the right direction. This does not answer all the questions about fielding. **We must address the transition issue in more depth and with a broad, holistic view.** We have to be smart on how we get to the end-state.

3.5 Organization

The organization and structure of the Army may be the area most effected by digitization. We are looking at changing the entire structure of a division. We are experimenting with how we should distribute information across the battlefield. We are analyzing the need for key staff personnel and, at some levels, the need for staffs altogether. We believe that **the basis for all organizational change should be the increased span of control for commanders that digitization could provide.**

3.5.1 Combat Power Objectives

During the symposium. LTC Gonzolez, EXFOR Coordination Cell, asked this question: "Are we [digitizing the force] to make the same sized unit more lethal or are we doing it to have the same lethality in a smaller unit?" [E-5] BG Ohle answered with, "Why can't we do both. Make a smaller unit and more lethal?" [E-5] LTC Greer then added, "Or you can keep the same size and be more lethal." [E-6] The argument over combat power objectives has become: should we do more with less, the same with less or less with less? The overall answer for the Army is not that simple. We believe that **the Army should make our lower echelon units as lethal as possible and use digitization to reduce the size of higher echelon staffs.**

"...[A]fter committing the resources we have, if we don't get smaller, we will get a no-go from Congress" [D-3-2] We will get smaller in the future. BG Ohle said that he "thinks that we have got a first-order level requirement and that's to fight and win at the small unit level...We cannot not be able to execute that. We have got to be able to fight and win any time and any place." [E-5] We believe **our reductions should be taken in staff positions and not in combat**

systems from the Task Force and below. We should maximize the assets at the lower echelons. The span of control of Task Force and company commanders will increase dramatically. They should be more than capable of handling this increased burden

When we talk about reducing manpower within the division, we must look at increasing span of control. Span of control is a training and leadership issue and should increase dramatically through the benefits of digitization and situational awareness. "We need to understand that digitization will flatten organizations. For example, much of the info that I used to receive in my office through my chain of command. Now, I receive the info directly from people who are two (or even three) echelons above me. The same will happen on the battlefield." [D-3-2]. We believe that **our experimentation and digitization efforts should concentrate on that aspect of force structure changes**. When company team commander can visually see the locations of his assets on a screen, he or she can control many more units. This also pretains to a Task Force commander. Increasing the span of control also results in reducing the size, scope and functions of a commander's operations centers. This may be where to look at *real* change.

3.5.2 Changing our Thinking on Tactical Operations Centers

In 1917, GEN John "Blackjack" Pershing took the American Expeditionary Force (AEF) over to France to join in World War I. One of the first organizational changes he made was to model his staff to be more like the French for greater interoperability. In 1921, after returning victorious with this new staff configuration, he had the entire Army adopt this system. This breakdown of responsibilities and basic configuration is still in use today over 75 years later.

"Maybe it is time to re-think the traditional roles of the S1 through S-4 and corresponding upper level staff organizations." [D-6-1] COL Baribeau spoke about how many analysts are looking at how "...our staffs are organized...we have people in the logistics community questioning whether they need 1's and 4's anymore!" [E-6,7] The conversation is not limited to changing how we manage personnel and logistics. "Maybe the Army needs to create tactical positions dealing strictly with the management of information on the battlefield." [D-5-1] **When we have information being passed from sensor to shooter, we do not need full blown coordination cells for Field Artillery or Air Defense Artillery in the Brigade or even Division TOCs.** "Command Posts will have to become integrating centers. DIVARTY, MI TOCs, Engineer Bde HQ will be replaced by Bde Combat Team CPs that are multi-functional and can plan, coordinate and execute multi-disciplined operations." [D-5-2]

What the manning should be in a brigade or division TOC is one of the top issues that TRADOC is experimenting on for digitization. **This is where we can eliminate most positions if we make our hardware and software work for us.** COL Semmens has a great deal of experience in working with digitization in a TOC. He developed and operated the Force Projection TOC while he was the Commander, Army Space Command (Fwd). Based on his experience, he made the comment:

> ...not everyone on the battlefield needs to be an information processor. By that I mean actually assimilate information, collate information, process information. Because we got the ability today to take a fusion device...and pump that information anywhere on the battle field very, very quickly. That is doable today easy, easy, on the move...You need to take the parts of the information, the TOC is not important, the information is what's important. You got to keep that in mind. The information is what is important and you got to take that stuff and pump it out to the guys who need it. [E-2]

Most of the passing of information can be done with filters in the software of our digitized equipment. This will allow commanders at all levels to receive information that is more relevant to battle command without the staff organization in what we now know as the TOC. **Even with the digitization and the filters and the automatic updating of statuses, at the brigade, division and corps levels, the commander cannot do it all.** We must consider that "these new command and control systems require dedicated operators while we still must maintain they entire command post's operations." [D-5-3] Our command posts will become information centers, operations centers and planning centers. We should man them according to these needs.

There still needs to be an information processing center to get the information from higher echelons and pass orders to lower echelons. "Industry is addressing some of these same issues by creating information officers and information organizations." [D-6-1] An Information Management Officer will be required in an echelon above brigade command post. The processing of information and filtering of information will be a tremendous challenge.

Command posts the brigade, division and corps levels will be much smaller and more mobile than the TOCs we have today. **Multifunctional officers with a few operators can accomplish more with digitized interfaces.** As we fully develop digitization and its capabilities to manage statuses of personnel and supplies, the need for dedicated operations like G/S-1 and G/S-4 will disappear. Command posts above the Task Force level will become lean and mean and will allow a commander to visualize the battlefield better than ever before. At the Task Force level, the changes could be even more dramatic.

3.5.3 The Task Force Staff

One of the interesting questions posed during the symposium was, "Does a Task Force Commander need a staff? ...Battalions fought on line during Desert Storm/no fancy operations. We only seem to do complicated operations at the training centers. Even at the NTC, I believe a TF commander can fight without a staff." [D-3-2] We contend that in a digitized unit, **a Task Force commander can operate with an Executive/Operations Officer and maybe an Information Management Officer** (though that may not even be required.) The increased situational awareness and battlefield visualization that digitization will provide eliminates the need to manage operations with a large staff. "[T]he advent of information warfare and real time information, might make commanders at battalion level and below more executors than planners." [D-1-2] This would not only dramatically change the way we operate at the Task Force level, but also how we develop company and junior field grade officers. The leader development issue and the training issue can be solved in a relatively short time frame. Up until now, a Task Force deploys with a staff that is very similar to the one that conducts its garrison operations. Can we eliminate the staff in garrison?

The Task Force staff officer's missions are very different in garrison and in combat and we should separate the roles. Digitization greatly reduces the role of an S-1 and an S-4 in combat operations. At the Task Force level, the role becomes almost negligible. In garrison however, the roles of these two staff officers have not changed. We could never afford to have an Army officer accomplish the missions of a staff officer in garrison but not deploy to a combat operation. We offer the solution of **a civilian contrator filling the role of a S-1/4 in garison and while a unit is deployed**. When the unit deploys to conduct training or combat operations,

these civilians could then remain back at home station and continue with the administrative operations. When units deployed to Desert Shield/Storm, many had to keep a Rear Detachment officer at home station to manage administrative problems, not the least of which was the problems with soldiers' families. This is a perfect role for a civilian contractor when the unit deploys. This allows all military officers to be utilized to the advantage of the Army and fill their roles in combat.

3.6 Interoperability

Regardless of how we plan to field this new digitized equipment, in the near future there will be digitized units operating on the same battlefield with non-digitized units. MG Rigby said that "...given the way the Army fields equipment, its always going to cause us to have a high-low mix of units." [E-2] Even when we are fully digitized we may fight in a conflict with units from other countries who are non-digitized. When we fight with units from other services, like the Marines, we may be ahead of them in digitization - or behind! In LTC Greer's words, we "have to make sure that digitization doesn't force you actually away from interoperability. But it has got to be something that is always bringing you closer to interoperability." [E-1] LTC McGinnis believes that we will have a hard time doing this.

> "[I]f you have an asymmetric force where you have got units that *are* digitized, assuming that the doctrine and the SOPs are consistent throughout, it then becomes a show stopper, in a way, if you have one force that is able to see the Relevant Common Picture...[and you have another force] doing it all by hand and doing it over the radio...then you are doing just what [LTC Greer] said. If you don't have the digital capability, the technologies, you are driving them apart, quicker. [E-1]

This is a major problem that we will have to deal with in inventive ways. "Liaison teams are the immediate answer..." [D-6-1] but they cannot be a long term solution because they require "...too many personnel and too much hardware to be effective." [D-6-1]

The symposium participants offered their ideas on how best to solve the problem of interoperability between digitized and non-digitized units. **There are no easy solutions. There are only suggestions at this point.** Probably the one suggestion which offered the most comprehensive solution was:

> First, we must develop operational concepts (FM 100-5) that can be executed by both digital and non-digital elements. Second, we must develop the TTP that will enable non-digitized units to generate and use a common relevant picture w/o the technology. Third, non-digital units must leverage the technology they do have.

3.6.1 Operational Concepts

We need to address how we change our operational pattern when we must fight with digitized and non-digitized units in the same battlespace. Through the use of simulations, like JANUS, we may be able to determine whether a commander should lead with a digitized unit and trail with a non-digitized unit, for example. We have some standard rules that commanders follow in the employment of Infantry and Tanks. We may be able to determine similar patterns depending on situations. The use of simulations is vital to this type of analysis. We have to analyze too many variations in terms of terrain and missions to accomplish this analysis through any other means.

We cannot vary our operational concepts too greatly until we can assure ourselves that we will never fight with a digitized/non-digitized mix. The reason for this is if a digitized unit trains using operational concepts which a non-digitized unit cannot maintain, when the two units fight

together, there cannot be any synergism or interoperability. This may *require* that we separate digitized and non-digitized units. This would only serve to push the interoperability problem to a higher level of command. Liaison teams cannot help in this situation because it becomes a "how to fight" problem. One could not work with the other unless there is a "how to fight" commonality between different types of units.

3.6.2 Tactics, Techniques and Procedures

LTC Greer believes that interoperability is not about technology, only that technology can help interoperability. "Common language, common graphics, common thought processes, a common approach to warfighting. That is what interoperability is all about. For years and years people have had interoperability and haven't had digital thing one." [E-1] We must concentrate on what we know interoperability to be now. **We have to have common graphics**. This is easy between digitized units. They have an RCP. This is more difficult with non-digitized units. Again, we would first think of liaison teams with hardware. This drives up the size of staffs and removes people from actually putting steel on target. Can we print out these graphics like we do now? Can we develop a fax system? **Architectural firms can fax huge blueprints. Why can't we fax overlays to non-digitized units?** We could even included a send/receive fax capability in the ABCS. This fax equipment should go with the non-digitized unit and not the digitized unit. This is an off-the-shelf purchase and it gets graphics and overlays to and from the non-digitized TOC immediately. They can then make copies and send it out to their subordinates. Is this slower than "[t]hree 10 men liaison teams per division with ABCS capability"? [D-6-1] Certainly, but not much.

There is a great deal more to this interoperability than faxing graphics, though. **There is a training piece**. "Seems that even non-digitized units will have to school and train their leaders in the common fighting processes that all the units in the coalition will use. This is as much about common training and education as it is about technology." [D-6-1] It is also about "common fighting practices". **We need to train our digitized and non-digitized units on the same things**. This is the TTP which promotes interoperability between mixed units and not strictly focuses on the capabilities of digitized units. To train "below" our fully digital capabilities in the name of interoperability is a difficult decision. Operationally we will have to decide whether to only operate in a pure environment, or change our TTP slowly.

3.6.3 Technology Units Have or Can Have Quickly

We have a great deal of technology in units already which can greatly assist in the interoperability. We also can **develop technology which will enhance the interoperability between mixed units**. We must utilize both of these approaches to push the execution of fully-digitized operations along.

Many units are currently fielded with TACFIRE/AFATADS. There are many units fielded with EPLARS, especially many Air Defense units. Almost every active duty unit in the Army has MSE capabilities with field faxes. Most all have SINGARS radios. These units could utilize much of this to assist in the interoperability. **We cannot just assume that a unit will arrive that will be completely non-digital**. There will be some units that will, namely Allied units. There are other procedures that we can follow in this instance. When two units are forced together operationally, they must immediately determine how they are going to pass information

digitally. The digitized unit would not have to provide full ABCS capabilities, rather they would only have to have the hardware to link the ABCS to what the other units capabilities allow.

We have the technology to make interoperability better. We are developing a computer system which translates information from a readable in an American command post to information readable in a German command post. This will greatly improve the interoperability of these two units. **We should develop translator boxes to pass critical information between digital command posts and non-digital TOCs.** When the digital unit receives information through channels, it can pass that information to digital subordinate units via ABCS. This translator box could take the same information and pass it via SINGARS using computer-generated voice. This is similar to what was used in Focused Dispatch. During this exercise, information was passed through SINGARS radios into a translator box and into the simulation automatically. Information from the simulation was passed back through the same box. It would only be a variation on a theme to do this between digitized and non-digitized units.

3.7 Readiness

The symposium participants rated readiness as the least most important issue on which to continue discussion. Probably because you can solve readiness problems three ways: "Training - Training- Training." [D-7-1] Others may have felt that readiness is an issue covered best in transition or leader development or training. We did address readiness in these areas. In this section we concentrate on maintenance and a broader definition of readiness than C-ratings: the preparedness of a unit to go to combat.

3.7.1 Maintaining Digital Equipment

Maintenance is going to be a problem like it is whenever we field new equipment. "Possible change in C-status based on digital systems being NMC." [D-7-1] The impact of a system going down will have a big impact on the unit's readiness. "If digitization increases force effectiveness, does the loss of digitization significantly inhibit the unit's ability to accomplish its mission? Redundancy and fall back systems must be in place to ensure that digitization is not a force stopper." [D-7-1] Most of the operators of the equipment will still be soldiers. There will more officers using the equipment as we reduce the sizes and the scopes of our TOCs, but in the near term, it will most likely be soldiers. **We have ultimate faith in soldiers to accomplish the mission. With training and time, maintenance on the equipment will be much like the maintenance on other critical items in a unit.** "With every new piece of technology we create a few "geeks" that are able to figure out how to make the system hum.. Without these folks, units flounder. This ought not to be. We should not build systems that are so complex that we depend on one or two smart people to figure it out." [D-3-4] In the near term, there will be some who will be able to really "work" the system. There will be others that will shy away and become ineffective. Through training we should be able to make sure the right people are effective with the machinery. **The problem will be when the systems are attacked by viruses and/or enemy sabotage**. The redundancy must be built in to make the system workable.

3.7.2 Readiness is about more than C-Ratings

George Allen[4], the former head coach of many football teams including the Washington Redskins, said "Winning can be defined as the science of being totally prepared." In the Army there is only one thing that is important and that is winning. If this is true, then we better be "totally prepared". We cannot expect to train on every mission with every force we may be matched up with and on every piece of terrain possible.

> Digitization may enable us to train our forces ahead of time on terrain that they may find themselves operating in during military operations. This is especially important when we have little or no time to respond to crisis situations. And will enable our forces to be better prepared for what happens on the ground that by simply studying the terrain from a map. Digitization will also enable the staff to start building a RCP based on information as it becomes available prior to and during the operation. It will also enable our forces to share the RCP real-time with other units preparing for the operation. [D-3-1]

Digitization will also help us with our interoperability piece because a unit can "train" with forces separated from it by hundreds, or thousands, of miles by using the digitized equipment "just before an operation or while they are in route." [D-1-7] We can use simulations and virtual reality to create combat-like environments that we can train our leaders and our soldiers with. We can "accurately replicate OPLANS so units can fight the war before they go--creating virtual combat veterans." [D-3-3] This is the area that digitization and technology will prove to be invaluable to the Army. **We will not have to use Mobile Oil maps of an area when we are deploying to a region again. We can *see* it, *walk* it and even *fight* it all on the way over.** If we can distribute and field the assets correctly, the possibilities are endless. That is our challenge.

[4] Note: George Allen did not attend the symposium.

4.0 Future Directions and Research

In the symposium we covered a great many topics. In the words of COL Kays when he introduced the symposium topics, "Clearly, we could take weeks to talk about any one of these things." [B-1] For many of the issues raised in the symposium and addressed in this report we *should* take weeks to talk about them further. Many of these issues have to be addressed in greater detail. Below, we recommend some issues (in italics) raised in this report and in the symposium that should be addressed in greater detail. Other issues raised in this report are already being addressed by organizations or by on-going experiments.

How do we develop training programs and who should do it? Training development is one of the major areas which we need to devote research effort. TRADOC no longer has the resources.

How do we get new training topics to the field to keep them current? We must improve the timeliness of training. We need to develop means of getting updated information about doctrine, tactics and new equipment to the field. The truth changes too rapidly and the pace will only increase.

What should the officer development system be for the digitized Army? We need to move our officer development system into the 21st Century along with our equipment. There is a research cell that is studying how to do exactly this. BG(P) Ohle will soon head this effort in Washington, DC. They need input and well developed ideas. The Army needs to be open to new concepts and dramatic changes.

How do we develop leaders to decide and lead? We must continue to make develop our leaders with an appreciation for the basics of leadership. We cannot develop a generation of

leaders who only look at a computer screen. BG(P) Ohle said that Battle Command is about deciding and leading. We need to develop our leaders to do both.

How do we develop the RCP to assist but not tie the hands of the commander? This is a tough question. It could be answered simply with tailorability and training, but it is more than that.

How does digitization change the way we fight? This is an issue both above and below the Task Force level. BG(P) Ohle said, "we don't know what we don't know." [E-5]. We will find out a great deal when we deploy a fully digitized and trained force to NTC.

How do we field the digitized equipment? This may be our most pressing issue. We have a number of competing problems in this area and we have already started in many areas.

How should we organize a Task Force staff to conduct digitized operations? We are looking at other staff configurations in numerous Prairie Warrior exercises and other AWEs. We should address this with the EXFOR and their training in the near future.

How do we use digitization to improve interoperability between units of the same and of different capabilities? In the symposium we firmly established that interoperability is not about technology. It is about units being able to work together in order to fight better together. We can do this with the help of software and hardware.

5.0 Conclusions and Recommendations

We cannot work out these issues prior to proceeding. We must work out these issues *while* we are proceeding. The digitization train will not, and cannot, stop or even be slowed. We must continue to press the digitization effort and make wise, but quick, decisions. General

Sullivan gave us a unique opportunity when he challenged the Army to "digitize the force." As we push forward we must keep in mind where our priorities should lie. MG Rigby reminded us that "in all our development of the soldier as a system, we've got to make sure we remember that...it's a flesh and blood warrior inside..." [B-6] We are doing this to improve a soldier's ability to survive and win in combat. That should be the track which provides us with our direction in digitization.

Annex A
List of Invitees and Attendees

We developed our invitation list by trying to obtain as many varying interests in the Army's digitization effort as possible. The first column in the table below lists the organizations we invited to the symposium directly. The second column lists the individuals from that organization to whom we sent the invitations. This final column lists the individuals from that organization who actually attended the symposium. If a line is blank, that organization could not send a representative.

Organization	Invitee	Attendee
Army Digitization Office	MG Rigby	MG Rigby
US Army Armor Center	MG Maggart	
Program Executive Office for Command, Control, and Communications Systems (PEOC3S)	MG Campbell Mr. Hart	
TRADOC Analysis Command (TRAC)	Mr. Bauman	
Deputy Commandant, Command and General Staff College	BG(P) Ohle	BG(P) Ohle
TRADOC Combat Developments	BG Kellogg	
EXFOR Coordination Cell	COL Metz	LTC Gonzolez
Future Doctrine, DCSDOC, TRADOC	COL Starry	
Colsa Corporation	COL(R) Semmens	COL(R) Semmens Mr. Brown
Battle Command Battle Lab	COL Lamar	
TRADOC Program Integration Office-ABCS (TPIO-ABCS)	COL Baribeau	COL Baribeau
OPMS XXI Precursor Study Group	COL Hoffman	COL Hoffman
Department of Behavioral Sciences and Leadership, USMA	COL Hallums	LTC Shattuck
1st Brigade, 24th Infantry Division (Mech)	COL Honoré	MAJ Agoglia
Combat Service Support Battle Lab	COL Matthews	
Marine Battle Lab	COL Wood	
TRADOC Battle Lab Integration, Technology and Concepts Directorate	COL Klevecz LTC Greer	LTC Greer MAJ McFadden

Other personnel attending represented Department of Systems Engineering and the Operations Research Center. They were: COL Kays, LTC Hutchison, LTC McGinnis, MAJ Phelan and MAJ Kwinn, M., MAJ Brown.

Annex B
Transcript of Opening Comments

COL KAYS: I'm COL Jim Kays. For those of you I haven't had a chance to meet, welcome to West Point and welcome to the Department of Systems Engineering and hopefully what's going to be a very productive six hours. I think we've got an unusual six hours arranged for you and hope that it will be very productive and useful to you. I'm going to take about two or three minutes off the top and kind of give you some oversight about what we're about here and then I'm going to turn it over to both General Rigby and General Ohle and hopefully set the stage for what we might talk about today.

The subject is digitization and here are some things that I'd like to cover to give you a general idea of the purpose and goals of what we're going to do today, our agenda. Some tentative issues -- I use the word tentative simply because they truly are -- in our first lab session we're going to define those, focus and prioritize and hit the things you want to talk about, the strategy we're going to follow, will let you know who is in the audience with you and a couple of admin points.

The purpose and goal. Our first purpose, and probably the main purpose, is to serve your needs. I just mentioned to a couple of you if there is a question in your mind that you want addressed, if we don't get to it today it's your fault. You will have ample opportunity to approach the issue, put your question on the table and pursue it. If you come away at 3:00 and say, gosh, we never discussed such and such, shame on you because you're going to get a lot of chance to do that.

Share information and points of view. We'll look at key issues. We're going to try to identify consensus where it exists, if it exists. And then on the other hand try to identify differences and issues where we think we have things we still need to pursue. And we intend to produce a product, in fact two products. We hope as you walk out of here at 3:00 we will be able to give you a preliminary report with this new group systems software that we are going to use, but we will follow it up with a more polished effort downstream. We'll give you a chance to comment on it before we go final on the publication.

This is the agenda. I'm going to stop here in a couple of minutes and turn it over to General Rigby and General Ohle. Afterwards we'll go down for about a 15 minute lab orientation. Enough so that you can get into things. And then we'll go through two sessions this morning, break for lunch about 12:00. We'll have lunch in here. It will be brought in and you can eat in here. We've invited you down the hall for a lab. We'd like very much for you to take the opportunity to see the labs if you can. But if we're sitting here at 12:40 and everybody's finished eating and ready to go back to work, we'll go back down to the lab at 12:40. So we really do want to make the best use of the time. We'll have one more session this afternoon, come back in here at 14:30, try to wrap up, and we'll put out what we think were the main ideas, let you all go through it a little bit check it our here and we'll snap the product with you downstream.

Some tentative issues: These are problems, but I think they are probably covering the major issues. Clearly, we could take weeks to talk about any one of these things. So

it's going to be imperative in that opening session that we focus in and get it down to the areas that you all want to pursue. But that's an opening bid and we'll replay that down in the lab as we move out.

Our strategy: this is a working session. Not a lot of fancy glitz. We're anxious to address and respond to your needs. We're going to rely on you to tell us where you want to go. There will be oral discussion, as well as use of group systems down there. So it's not like you're going to sit down there quietly and just tap into the computer. There will be a lot of give and take and a lot of discussion. You're also going to be banging ideas out. And if you don't want to raise your hand and you get it into the computer and it's up on the screen and let folks attack it up there.

We've got a lot of folks here. We've got a pretty good cross-section of folks in the Army working these issues. I had that next to last one done this morning. Information operations, CBRS assessment with DTLOMS focus. They just come out with final product. Jim Armstrong here in the department said in that effort -- I think it's overseen by General Cravens, TRADOC -- and they've just come out with a whole package of things. A variety of military academy departments are going to come in an out today as well.

BG Ohle: Who did that?

COL Baribeau: It came from the -- the space folks did it and it landed on a desk?

LTC Greer: Yes, sir, per General Cravens.

COL KAYS: I think the next step is they're going to go out and brief him. And I think they're coming to you, sir.

We're going to televise and record these sessions. Those tapes will be available to you. There's a communication room set across the hall if you need to get back to your home office to make phone calls or whatever. I mentioned lunch in the conference room and the optional lab tours.

And with that, sir, I'm going to sit down and be quiet and sir, you're on.

MG Rigby: I really appreciate the opportunity to be here and certainly to bring some great minds together on issues that concern all of us. As I look out over the audience I'm sort of reminded of that line from Casablanca, "it looks like we've rounded up the usual suspects", because most of you guys I've work with everyday.

What I'm going to try to do is very quickly here -- and it will be old hat for some of you but perhaps a number of you it will bring you up to speed -- is give you a snapshot in time of where we are on the digitization axis and that will transition into Dave Ohle's talk about how we're going in the total Battle Command area as we migrate toward digitization. And you will see that most of my issues in the ADO access focus on transition issues and interoperability issues. Just a quick reminder, we all know what Force XXI is not. And certainly General Reimer's quick focus on that is that it's the Army -- the word Army is back in it, not just Force XXI. It says Army in it first.

The three axes -- you have General Ohle representing the Joint Venture axis here today and me representing the digitization effort.

Now, what a lot of people do not know is that the Army's total effort on digitizing the battlefield is part of an overall joint effort . Although, the Army was the leader in putting together a mission need statement , taking it to the JROC, and way back in January of '95 getting an improved joint mission need statement that said every service pursuing operations in a digitized battle space need to put these five categories of requirements into that system. And I think that all of our sister services in their efforts in differing degrees of enthusiasm are migrating toward those required capabilities. One thing that we are going to try to do as we get down range, probably after the brigade AWE is to take the ORG that Steve Baribeau and his guys down at Leavenworth are working on and migrate that into some kind of joint. I think that's the right way to do it.

This was my campaign plan I put together two years ago and I'm going to focus on giving you a quick update with a lot of attention to the architectures because I think that is the central issue of interoperability. This transition to common architecture is not only within the Army, but within the Department of Defense as well.

Here's where we are on our own architectures within the Army. The operational architecture, which is nothing more than the layout of the battlefield process and the information required, the time lines we needed them, are being done by TRADOC. We're going to have the task force operational architecture completed in June. The reason it's taking so long is there's been some funding issues with that. But we're using the IDEF zero methodology to lay out in great detail the battlefield process. That would enable us then to finalize systems architectures for the total Army, not just for the Task Force XXI. For the systems architecture, which is the physical layout of columns and computers to support that operational architecture, General Bill Campbell, PEOC3S desk, is doing that. He finished the baseline back on the first of March, which was great because now we have a baseline to institute all the changes that have been made in here at the last minute in Task Force XXI as we implement some of the division reorganization issues like how combat service support would be employed, brigade recon, and so forth. So it's good we have that baseline in place.

Probably where the Army is the leader in the Department of Defense is in the technical architecture. 4.0 was just published back on the 30th of June. That was very quickly adopted by a DOD working group in representation of all the services of the joint staff as being the starting point for a DOD technical architecture. Now, they have a very ambitious timeline to have Dr. Kimenski, the Under Secretary for Acquisition, sign out that joint technical architecture this coming July. That then becomes the mandatory architecture that all new systems across all the services will have to adhere in their development. Plus, the second requirement will be to have all the legacy systems migrate to that technical architecture.

Now, at this point in time that joint technical architecture looks exactly like the Army technical architecture. So we're in the catbird seat right now. Next slide. And as they will probably tell you a little bit later, this is our vision of how the Army C4I architecture and the DOD C4I architecture will look if we successfully accomplish moving to a common technical architecture within a common operating environment, open systems and commercial standards of practices here. The Army global command

and control system, of course, interfacing with the DOD, which is the basis for interoperability for all the services. The Army tactical command and control system at corps and below and our latest force Battle Command system, which is brigade and below operations on the digital battlefield . This software is being developed in conjunction with the stand up of Task Force XXI.

I told you that this technical architecture is underway. There is a version out for comment now with all the services. There are some issues being raised, but it looks like no insurmountable issues. There are some changes going on in that technical architecture. But I told you when the final part of it comes out in July we don't expect any major deviation from what we have already started putting in to our new systems in starting transition plans for legacy systems.

When 4.0 was published earlier this year we had the vice and the AAE sign out the implementing instructions on that. I pulled together a migration plan summit on the 22nd of February and that whole summit was directed toward how do we take some 150 legacy systems and migrate them to this common Army technical architecture. Because the Army has made a very fundamental decision. Our systems are going to be forward compatible, not backward compatible. And the rationale behind that is if we don't break away from backward compatibility, we're going to be stuck with proprietary systems until well after the permanents get here. Forward compatibility is what we are striving for.

In POM 9803 we did get 29 of the most critical systems funded in the POM. Migration plans to migrate to full interoperability. And the mark of the wall is all systems, all 150 or so developing migration plans, migrated back to 1006. Of course, the benefits of all that are interoperability and cost savings.

You're all familiar with this experimentation plan. I think two very successful AWE's that allowed us to develop the tactics techniques and procedures to support the brigade exercise and will drive the TTP and the organization and equipment of that brigade. Not only did we develop TTP, but out at focus dispatch we have a very very good database that we're using in network loading, modeling and circulation now. So for those of you that interested in doing that kind of modeling and simulation, that's a good database and it's in a format that you can use with most of the network loading models that are around today.

You've probably also seen this, but I use it only to show you that we're not just focusing on the maneuver portion of the battlefield operating systems, but putting enough digitized capability across all battlefield operating systems and across all the types of units in the task force so that you get a good picture of the synergism of the application digitization.

It's a busy time out at Fort Hood right now, as my colleagues from the EEC can tell you , because we're not just putting appliqués on platforms down there. There's over 100 equipment related fieldings going on right now, to include 37 brand new systems that that division would not have gotten unless it had been designated as the X4. It got 63 prototype systems. All of those require some kind of integration into the current combat platforms and the equipment training for the soldiers. And that's overlaid on the division's normal training exercises part of the corps.

Another picture of how it's working, these are all the things we're trying to put on combat platforms as they roll into an installation facility down there over 40 vehicle types, almost 900 vehicles. When I made this slide it was 145 days. There's nowhere near that much time left. One hundred and seventy-five different configurations on these vehicles at the same time we're loading the objective software. And to complicate everything, the most simple piece of this whole operation, that is dumb iron installation kits, are the only thing that's running late right now. So I think we've turned that corner, though. But this facility is something to see and I would recommend it to you if you get down to Hood.

Tactical Internet, still the long technical pole in the tent. Taking legacy comm systems, SINGARS, EPARS and MSC, linking them with routers with commercial Internet protocols and attempting to gain seamless flow of message traffic between those disparate commo nets . We're building component out at EPG now, doing a lot of data collection, a lot of modeling and simulation. There are problems, but the general concept is working. I think with a pretty high degree of confidence that on the first of June we're going to put in place down at Hood a tactical internet that will support certainly the initial levels of training, platoon, company, with battalion links. We will evolve that tactical internet for actual use on the ground. We're not going to stop the integration upon delivery down there. It will have links into the strategic networks and the other services. And we decided to build into the systems architecture data haulers. We know that the tactical internet is not going to provide demand with -- or high demand requirements like video teleconferencing, live imagery so we're using direct broadcast and ATM switches to handle that heavy traffic. Next slide. Now, I've tried to simplify what the integration picture looks like within the Army. And there are three components to it. And, General Ohle will talk a little bit more about this. The first part of the integration is to take all of our command and control systems ranging from the Army global command and control system through the ATIC system, make them fully compatible with the brigade and below command and control system, fully compliant with the Army technical architecture, fully compliant with the variable message format, which would be the most efficient means of passing digital traffic. The second piece of integration then is to take our embedded systems -- and we do have a few of them out there now. The M1A2 is already fielded. We'll have about a division's worth of those and we'll have to go back and redo, bringing those up to an Army tactical architecture VMF format. We do have a program ongoing right now to roll off the line something called the M1A2 SEP in F199. Those tanks will no longer have the IV system. It will have a force Battle Command brigade below system installed as their primary command and control system..

And the last piece of the integration is to take the appliqué and make it the objective system for platforms that never had the digital capability. Those are the three components that have to be migrated to technical architecture compliance, common operating environment, common managed control software VMF and integrated data comps. It's not just a single area.

This is something that I'm pretty excited about. It's called the international command and control systems interoperability project. We have a funded experiment, a total of about 12 million dollars by each of the players with the French, the Germans and the British. For 40 years we've been trying to get commonality and protocol standards

and a message format with NATO and we've failed miserably. So the next step we're trying is to go to a box that would translate national protocols and standards and message formats from one country to another using that country's radio systems. Boxes would go in each TOC and be connected TOC to TOC. We've got this thing working on the bench up at SECOM with German standards, protocols and message format. We're shooting for a field experiment in Germany in '97. This may be the answer, not only to coalition interoperability, but based on my progress with the Marines and the Air Force, may be the answer for interoperability with the other services. Let's just use the power of the processor to do that translation instead of all of us trying to agree a single step of messages and standards.

The Army's digitization master plan. And I'll offer this as just a commercial , the latest version published in March. It's on the web now and you can pick it up there. But we got a lot more sophisticated than we were in the first version of the digitization plan and we started to include those three thrusts of integration that I talked about a little bit earlier, getting more into the joint arena, more into the international arena. So I can hand that to you as a good master document.

As I was saying to my friend, COL Kays, earlier that despite digitizing everything, it's still going to be the guy inside that XO skeleton armor with all his digitized columns that's going to win the battle with his rifle and his bayonet. And in all of our development of the soldier as the system, we've got to make sure we remember that. That's a flesh and blood warrior inside all of that equipment.

And that concludes my briefing. Do you want me to answer questions, Jim, or just let it rollover?

COL KAYS: A quick question or two and if not we could just move right along.

MG Rigby: David, I'm sorry for taking more time.

BG Ohle: No, that's okay. We're going to go digital on our screen. We'll see how this goes. Steve Baribeau, who is with me, who is actually the director of TPIO out at Ft. Leavenworth was a plebe in my company so everything that he does or fails to do is my responsibility. So now he's under me so you know how that saying goes around.

* Now, when Jim asked me to come up here to talk, I think he asked me to come to talk because I used to be the old director of Louisiana Maneuvers and I really had an interest in what was going on. I came up as director of LAM and saw what was going on here in the department, took a look at the lab. I've invited other people in Louisiana Maneuvers to come up and take a look. And we've got a lot of projects that are working with the department here to move into the digitization arena. And the title of this is absolutely perfect, "Directions in Digitization." It's good. But I must tell you, since the invite, it's a moving target. Things have changed in TRADOC. General Hartzog and General Holder now have given me the proponency for all command control in the whole Army. I am the Deputy Commandant of the Command and General Staff College. I run the school. But now more and more is coming over to the school house and I now have that responsibility. When I took over this summer they moved the Battle Command Battle Lab into the Command and General Staff College. Now they moved TPIO in and

we put the two together. Steve will be in charge, so I now have the oversight of command and control for the Army, setting the doctrines -- doing the DTLOMS - and Steve will go into that -- for the Army in command and control.

Now, what General Rigby talked about was absolutely the right way to start because that is the initiative that takes the Army into the digitization world, the ADO's effort. But General Sullivan always used to say that doctrine preceded -- is the engine of the change. It precedes everything. And so I would just remind everybody that even though we have this campaign plan for Force XXI, really we got into digitization when General Franks started and wrote the new 100-5. In the new 100-5 we developed a term called Battle Command. And that to me was the watershed mark where we were moving into the 21st century. We were creating a new term. We weren't just calling it command and control. We weren't just calling it leadership. We were bringing those functions together and we called it Battle Command. So I'm going to talk from the Battle Command perspective and then turn it over to Steve and let him give you the overview of where we are in command and control in the Army and the Army Battle Command network. So I'm talking a little bit about Battle Command and then Steve will talk around here and we'll outline for you where the Army's going in Army Battle Command system. This might run just a hair over, but I think it's absolutely important. And it fits right in with what General Rigby said because he's moving the Army forward in the digitization effort and we're trying to establish this umbrella that everything fits under so that we are sure that the standards, protocols, architectures are all compatible when and they all meet and that we have a review process for making it happen all the way from the foxhole all the way up to the strategic level, but more importantly having all the players play, TRADOC, the ADO and West Point. West Point has got to play in this. I mean you can help the Army in this process. So that's why we appreciate coming up here and being part of this.

Another thing that changed in the landscape was General Hartzog, as we put together the division structure for Division 21, went to what I call a new blueprint of the battlefield. We have battlefield operating systems, we have functions, and now we're going to patterns of operations. And we might get in and talk about this as one of the subjects, but three of the patterns are pretty standard: protect, project, and sustain the force. Those are pretty standard and you could fit those into the old mold. But where force XXI differs, I think, from the way we did business before, is now we have gained information dominance. And that focuses on digitization. Shape the battle space. That focuses on digitization because only with this new technology are we going to be able to do that. And that fits right in hand in glove with Battle Command. Battle Command and battle space were the two initiatives that General Franks put in the new 100-5. And then finally decisive operations. And if you look at those three patterns of operations and think about how we're going to fight the 21st century, I think the effort that you've got ongoing here, Jim, and the way the department is going and the Army is going through the ADO will all come together as we do the experiments with the X4, the experimental division -- Fourth Infantry Division, at the brigade rotation in March of next year, and then the division BCTP exercise in November, Jim. I think it's in November.

LTC Greer: Yes, sir.

BG OHLE: So that sets the stage. So three things have happened. Number one, the doctrine 100-5. Number two, these new patterns of operation that you really have to understand and know if you're going to think about the Army for the 21st century. And then number three, how we are structured at Fort Leavenworth and in TRADOC and in the Army to handle Battle Command.

Ed Anderson, General Ed Anderson was the old commander out at TRADOC who had command and control under him. He left to go up to be the director of FP in the Pentagon and nobody -- I mean everybody did bits and pieces, but nobody was in charge of command and control for two years in the Army and we just sort of bottomed out. So General Hartzog and General Holder and myself and Steve, we've all come together and we said we've got to get this back together. So what we're doing in command and control integration fits right along with the digitization. It fits along with the doctrine. And it's going to take the Army to the 21st century. So I think it's important that you understand the setting, to me, that this conference focuses on and that is it gets us right in to the thread that goes through digitization right from doctrine, which is the beginning, through what General Rigby is saying, to command and control, which I'm going to talk about now. So I'm going to talk a little bit about Battle Command. But immediately within hours you've got to be able to move. So the decision cycle is about the same, but the time differential is what's different. So we've got to be able to adjust.

Now, the future battles be characterized by these so we must be able to win decisively. And that's why General Hartzog, as he designed the new blueprint of the battlefield for the 21st century, said we've got to focus this around digitization. We've got to change the functions. We've got to focus our doctrine and our writing and our structures to a new way of thinking. And that is the patterns of operation. And this fits right in the future battles.

We have to leverage technology. That's what General Rigby's all about so that we can control the tempo, enhance the values liability. That's really the tenancy of what Force XXI's all about and reduce the ambiguity.

Now, what is Battle Command? This is right out of 100-5. It's two things. To me, it's deciding and it's leading. Always before for command and control we focused on the decision making process and we sort of put, you know leadership, motivating soldiers aside. We've got to make sure that we bring that back. We bring the art of command back. And I'll show you on the next slide how that is. But this is the definition right out of the FM.

It's the art and the means of leading on the battlefield to make these decisions to leading soldiers and motivate soldiers. How do you bring that together? How do you set up your systems? And how do you get that flow from the foxhole up through the strategic level or from the strategic level back down to the foxhole through what system? Through systems that have approved and coordinated architectures.

The objectives of Battle Command, right here. And this really developed out at the NTC. I was out there on a rotation. And how do you operationalize Battle Commands. You've got to be able to see the enemy, see yourself and visualize what the end state is. And then you set up your systems to be able to paint that relative common picture so that you are able to do that. Now, should you be able to have sense of Battle

Command with -- the systems that we have now, yes. I mean over the radio when you listen to the radio you're really doing Battle Command. But what we hope to do through this digitization effort is to enhance the capability of the command and staff folks in the units so that they can do it better, quicker, so that we get that decision time down so that we act immediately and can deploy troops in a matter of hours.

I'll turn it over to Steve and he'll talk to you about the ABCS system, which is really the heart and soul of Battle Command. Steve.

COL Baribeau: I guess the first -- that was a great layout of how the battlefield is secured. I've actually been in the business now since March of last year. And in fact, there was no one at home at TRADOC to include the combined arms center and command and control business. We were writing doctrine, we were doing organizations, but there was no one bringing together a holistic view of the battlefield. We had each of the schools and centers pretty much doing their own. And as a result of that, a lot of people picked up a lot of balls and ran them from a lot of different directions. So the energy that we're about today is to try and put aside all parochial concerns and to bring people to the table so that we can get back into a groove of one sort of another, never with the kind of resources that General Anderson had. When the CAC-CD stood down I think he had 405 people. I've got about 37, I guess.

BG Ohle: And I've got zero.

COL Baribeau: And so what we're doing is we're trying to figure out how to matrix manage and get the people to do the right things. We have four in division doctrine in the college. We have battle lab, part of the command. We have the TPIO, which is responsible for integrating all of the systems, and I'll talk about that in much more detail. And then we have also TSM, MCS/AGCS which is being stood up as we speak, I believe under the colonel who is going to be in charge, but I'm probably not at liberty to say. He'll have between a six and 12 men cell and so it will help us to develop those two programs that we're developing together. I think a little later you'll understand why it's good one TSM's doing both. And then we've got the leadership department down at the college, the Center for Army Leadership. We've got the center for Army Lessons Learned. We've got ACTP. We've got the training and development director at Levenworth.. And we all work together, which is what exactly General Holder and General Ward had told us we must do. We in fact have the resources, not like the old days where you can kind of make work, but we have the resources to holistically take a look at the problems. And I'd say there were and the weakest link right now is training development. We did away with a lot of training developers when we reorganized TRADOC. A tremendous number of training developers were done away with and/or moved and then ultimately used as other posts and centers resources to downsizing. And so now we're looking around the battlefield trying to find people who know how to do curricular development; people who could help us to figure out test support, training plans, and all those sorts of things that are fundamental to the business of getting collective training into the units. It's actually gotten harder to do collective training on these systems than it was in the past because you used to do stove pipe systems. Now

you've got all the systems working together in a synergistic manner we hope. And so the training development piece has become, in my mind, the long pole in the tent for DTLOMS.

Why ABCS? And I don't take credit for coming up with this idea. Actually, DOD did, which I think is kind of interesting because they realized -- they looked around the battlefield and they said we must have a system. They called it the global management control system. Intercepted an E-mail of Admiral Gouse from DISA, who's the head of GCCS the other day and in it he said this is not a system of systems. This is a system, GCCS. It includes the Army, Navy, Air Force, and Marines. It's based upon standards and protocols. You must comply. That is the way of the future.

I say the same thing at the Army level. So it's kind of interesting. And we have adopted that GCCS philosophy lock, stock and barrel. The other services I might say are coming around. But they have had some real -- if you look at the Air Force as an example with their tactical, with their logistics and their maintenance stove pipes, they had some in place managed control systems that are going to be really interesting to see them break down and make one.

We in the Army, I think, were at a point in time in our command and control systems where we were being frustrated by all the different systems we had. And so I think we were a little more mentally prepared to tear down the walls and try to start all over with something that would work a little bit better. So we as a service have taken this on and I think really honestly accepted it as our responsibility to try and lead the Department of Defense. We know this much. We in the Army figured that out real quick. The fact is information dominance is the weight of the future. We know that if you do not establish your system on commercial standards, you can never afford to keep up with the future. We don't drive the technology anymore. The technology drives us. We don't have to sit back and ask for someone -- or sit back and tell someone to develop us a digital radio. They're coming and beating down the doors. They wanted our money to develop a digital radio that they then can sell to UPS. I mean so it's not just us anymore, but they like to use our money to do it. They've got to use an open environment. And I think the thing that we're looking at right now really, really hard is you take the deliberate decision making process, four steps -- we as an army have inculcated that quite well. I was on a Battle Command training program for three years and I was the commander controller observer controller for the program and I observed nine division war fighters, ran the seminars associated with them and three corps exercises. And the thing that became very clear to me is that as an Army we had a common point of departure and it was an alert decision making process. We did it slightly different among the divisions and among the corps, but in fact there was -- you did mission analysis, you did courses of actions, developments, you analyzed the courses of action, prepared the courses of action, you wrote your order. Very time intensive, very frustrating at times, especially for the people learning that and who had not had the opportunity to exercise it time and time again because that's what it took. You had to do it a lot of times before you really got good at it.

What we're trying to figure out now is we are -- we don't want to just automate that process. What we'd like to do is determine if when we automate it we in fact can't

streamline it even more. Perhaps change it, turn it in to something that is even more efficient. So I think that's become very apparent to us.

The other thing I mentioned out here, standards of protocols. We call that defense information infrastructure common operating environment. I'll say a little more about it. But basically it's standards and protocols. That's really all it is. It's the technical architecture spelled out in some very specific information terms.

And finally, the bottom like is you can't have eight systems anymore. You can't do that. You cannot afford to keep a PM, a TSM, and a bunch of industry busy building stove pipes. The fact is, as we're even going to find that , I think, our greatest savings once we get the hardware piece beat into the ground and we don't have to stick hardware, the real savings is going to come when we only build the software one time and we share among the services. That will be the real money maker.

Here what it wants to do, it must have a seamless architecture. It must link it to GCCS. You must be able to use it in a joint environment. A land proponent commander must be able to go both ways. He's got to be able to work in global command and control. He's got to be able to work in the Army Battle Command. That crossover point is AGCCS are equal in control. And each of the corps, divisions, brigades, and battalions all the way down to the platform have to be able to be seamlessly connected.

Again, apply with the standards, functional requirements and then provide access to the force level information database. That right there is really the difference between where we are today and where we're going in the future. Today we use messages to send information back and forth. And if you're going to capture that message information you've got to put it in a database. But the fact is what we want to do is we want to use the message to fill the database and then let people go get the information. That's the fundamental differences as to where we're actually going in the future.

I've heard General Hartzog say that if the C2B or the A2C2S, which is the Army air space command and control system, or even the BCD, which is an initiative that's going on right now at the armor center, if they cannot allow us the capability to operate on a move, we don't want it. How are we going to do that? We'll we can talk about that later. But wireless LANs and things like that are the key to the future. The fact is if we're going to have a fundamental difference in the way we command and control, we've got to get away from the large Static Command Posts. We've got to be able to move around the battlefield, follow the move to contact, not sit somewhere, jump another TOC, etc.

We've got to use field and strategic and tactical systems and continue to evolve to numerous systems. We can't build a system and build a unique requirement for it's communications capability. We've got to be able to host modular software and be able to grow the system because that's the future. Once you get the hardware in place, once you have the comms in place, then it's a software world. And that's probably where we as a service are really pretty far out. I think we have accepted and understand that it's fundamental. And you have to be able to operate under the same nasty conditions we've always had.

In the Cold War we had -- and we still have to a great degree -- we have a lot of BFA's being supported. We have an Intel system, we have an air defense system, we have an artillery system, we have a kind of maneuver control system. It comes in various

shades and flavors. It could be a Microsoft system developed by a corps down to the old version 10, which was the lunar landing, the thing that kept the ten flaps from blowing and all that sort of stuff. That's a big E-mail system is all it was.

Connectivity verses interoperability is what we had. In other words, we could connect to one another, but we couldn't really interoperate. If you go into a command post the information would come into each of the corners of the command post and everybody would rush to the center and they'd put it all on the board and then they'd use their stickys and I mean you've seen it. Very, very inefficient.

Hierarchical flow is what I've just described, large static CP's and large staffs.

That's kind of a pictorial of what it was. We did all of this stuff up here. The commander surrounded him with this group and that group and everybody was working real hard to try and do their thing. But I'll be honest with you. If you've ever walked around and talked as many times as I've had and you've watched what was going on, each of these guys were in it for themselves. Everybody was in it for themselves. They knew he was important and they would give him what he wanted. But half the time they'd give him about ten times more than he ever wanted just simply because they have the information and had the where with all to provide it.

The future has got to be everybody linked. We've got to have sensor to shooter capability. We have to be integrated both horizontally and vertically. The command center automated tools, we've got to change the way we do business. The Deliberate Decision Making Process would probably migrate and evolve hopefully near real time. I would tell you it's got to be real time. They have a definition for near and real time now. It's less than 16 seconds, I believe, is real time. Believe it or not, the joint world came up with that. And we must have on-the-move.

What we're doing right now is -- and I'm using MSC kind of as the centerpiece that would be visible. Think back to the old APEX system. We probably drew the star improperly from the very beginning. We always had in the center of the Pentagon we had combat net radios, very common user systems and data records. But if you think about, MCS should have been in the center all along and you shouldn't assume that the comms provided you the ability to move the information around the battlefield. That was -- we missed that. But what we finally realized is that MCS and AGCCS and even FPCD2 are the tools that the commanders use at the various echelons. The BFA's, the bosses, key information into them and it's manipulated and used from the bottom, the appliqué of the FPCP2 and it's probably from the battalion all the way to the corps level MCS and then from the corps level and up by the Army global command and control system. So we finally realized that MCS for general purposes is the integrator of information. The thing that brings it all together.

So, just as a display here, these are what we've got right now. And you could label this, you know, air defense, artillery, and we could go right on down the line. These are the stove pipes. Where we're at right now -- and not to many people have seen this. I mean I don't think Joe has even seen it. I'm sure the folks at BLIT haven't. Unless you've been to Monmouth you haven't seen this. What they've got is they've got not each of the BFA's on a common operating card. And actually, it's a kind of a hybrid in between version. The DOD COE is over here. It's 19 modules in specified very specific ways of handling information. And our Army systems today, the APEX systems have

about that much of that much. Okay, I mean they're moving, but they have enough fundamental basics. But I think what we'll see in Task Force XXI early on is that MCS will in fact be performing its integration responsibility to some degree. And it's going to be basically described by what we call the client/server environment. In other words, we're not going to have total data exchange capability. What we've done is we've described who the clients are and who is going to serve those clients. And we have some very specific rules in this first version that will be followed. But basically, MCS will be able to build the common picture. It will take information about the common air picture from ADA. It will take the overlay from the artillery. It will take in the red feed from the Intel community. It includes them. It will be real time. It will by dynamic. And it will then be able to be distributed both horizontally and vertically. So that's kind of the first step. And if you're in a BFA and you want to go see a common picture and you want to do so, you go down and you get it.

So we're going to start to see that. And that's about where we are right here on this model. So again, COE -- everybody is on CHS2 now except for AFATADS. And the only reason APATAS is on CHS1, which is a Hewlett Packard 735 verses the Sun Sparc 20 everybody else is on, is simply a matter of fielding. They are actually a fielded system and it was just too expensive, prohibitive, for them to immediately jump to the Sun Sparc 20 since they just put the Hewlett Packards in the field. So we're going to give them a year and a half or so to start to migrate to the new system.

Once we got this, we've started to prove databasing works. Then what I think we'll start to see -- and this will probably be about the time of the division exercise -- we'll start to see data exchange. We'll start to see the systems really and truly finding themselves working together with the idea of a force level integrator. And then finally what we'll end up with is we'll end up with what we call unique and common applications founded on common hardware, common operating systems -- which by the way this is Sun Sparc right now. This is Solaris 2.4 and then this is the DOD common support software, which you've heard me to refer to as the common operating environment or DII. What we mean by unique applications is those are applications that only are used by that DFA. You know, air defenders use it to do engagement ops. That's unique. It's not something that other people need, so the air defense school will continue to build and modernize that software.

However, the software that provides a common purpose to a lot of different commanders will be done by one PM. And it will probably be a PM op task. It's probably going to be called PM common applications in the future. For example, right now we have two UTOS, unit task organization software. One of them is used in the CSSC system, the logistic system. It has a unique logistics flavor to it. And then you have one that's an MCS that has a unique war fighter flavor to it. But we only need one. And fundamentally the code is about 80 percent between the two. So we're paying two companies right now to build these two different systems. Well, obviously that will become a common application in the future and will be built by one software developer. It will be my job to go around and pick and chose among all the different BFA's and to migrate these different software requirements to the proper location.

This kind of looks like what we would like to get to on a functional system where information is fed into a virtual database and the commander -- well probably the greatest

example is -- has the ability using that database to build a relevant common picture. Relevant common picture -- relevant being the key word. You can have a common picture and you can distribute it up and down the battlefield right and left, but if you're a battalion commander you have some unique requirements. If you're a division commander, you have some unique requirements. So the map backgrounds may be different. But where the points are on the map, regardless of region and scale, they are the same relatively.

I kind of think the day will come when you'll have an electronic SOP as opposed to a paper SOP and you'll set the defaults and requirements one echelon to the next to the next so the division commander walks down the brigade CP and goes to the map there are certain things he demands to see, just like today. There will be certain things on that relevant common picture that he will want to see. Other than that, it's up to the commander's personality. He will do the same thing to his battalion commanders, etc. So I think that's where we're going to evolve in the future.

Big picture. I kind of saved this for last. Believe it or not General Miller likes to start off with one that's even more complicated than this. I mean if you could understand the first slide that General Miller shows you, you don't even have to worry about it, you're already digitized. But we kind of save this for last.

What we've got here is we've got the GCCS based upon COE. The Army builds six of the 19 modules, the Navy builds six of the modules, the Air Force builds six and DME builds one, obviously the map piece. And we're all in it together. To be honest with you, I think the Army is actually doing more than six now. I kind of think we've assumed control of some of the others because they're not moving fast enough so we're doing it kind of for them. But be that as it may, in all the infighting up in the Pentagon as it might be, there is a COE. The Air Force calls theirs CTAPS. The Navy calls theirs JMCIS, that's Joint Marine Command and Control Information System. And that's -- that one is spelled out. Oh, I'm sorry, they're all spelled out. ABCS and then TOC for the Marine Corps. By the way, the Marine Corps has already decided AFATADS where they want to go. I think they like ASAS. I think they like MCS. Before you know it, pretty soon we're just going to have one big bubble down here. Which is good, because we're a land component. And that just reduces the amount of turmoil we have when we come ashore.

This is global piece again, COE connecting. And this is the lap over, if you will, for the Army's system. It's software, based upon common hardware, common operating environment, and COE -- it's software, it allows an Army commander who is functioning as an R4 commander, a land component commander, or a CJTF to interface with his Army responsibilities. He uses GCCS as the joint commander. But he uses AGCCS as he interfaces to his own force.

We're in the middle of building or trying to determine what those requirements are right now. I would tell you the future is this will migrate away and what you'll have is you'll have at least down to the battalion level, I think, one suite of software that it really doesn't matter whether you're operating joint or whether you're operating strictly as an Army force. You will have the menu and be able to just pull it up. If you're going to do JUMPS work, if you're going to do TPFDL work or whatever you're going to do,

it's there. It's loaded, it's on the server. If you want it, use it. If you don't need it, it stays on the server.

Then you can see all the pieces that are in this ABCS. And then you can see the things that we have been told we must migrate into it. They must also become part of the common operating environment. And this one is a big one right now in TRADOC. We realize the power of the sustaining base. If you're going to do split based operations, contingency operations, we must be able to figure out how to get our base ops to operate as part of the tactical systems. When the war fighter information network that the signal center has conceptionalized and is beginning to push accepts the responsibility all the way from the DOL at Fort Bragg into the theater, down to the platform. And we're going to work together with them because I have to do the operation architecture of that sustaining base piece so that we can figure out exactly what the most efficient rate of doing that is. It's propped with all kinds of danger. I mean we're going to tell DTLOMS how to do their job. And I think that will have some interesting impact on how we can do this as an Army.

These are the components -- I won't be spending much time, but again, those first three layers -- hardware, software, and common operating environment, the standard computer or comm systems, the platforms, those applications I talked about, and lately we've finally realized that if we don't add simulations -- make simulations come to us, that we will never be able to meet up with all of them. So the high ground is ABCS and the CRB, the Capstone Requirements document that should be signed within hopefully a week and a half will require simulations to build to the ABCS.

These are the challenges that General Ohle has placed on myself and the battle lab to take a look at during Prairie Warrior. We are integrating a suite of software. It is not the COE suite of software. So if you hear it, just clear that up. The COE suite of software, the only one that exists right now is in Fort Monmouth, New Jersey. And it will be brought to Task Force XXI and it will go through IOTME in November with the 1st Cavalry. But there has been some great work done in the Prairie Warrior to prove that you can pull together the software that currently exists and you can work in an integrated matter. They're using a philosophy called CIC. More I'm sure will come up on that. It's a way to manage information. Clearly, it's commander focus. Do away with the guys worrying about their BFA. You put them in an environment where they're worried about what the commander needs and they go and get the information. That's the philosophy.

Operations and Intel pictures are going to be working together and I think better than they've ever done. We're also looking at flat plate displays, command and control vehicle configurations, voice configurations, etc. By the way, we have in fact accepted the Microsoft Office 4.3 Charlie will be the new CS system as will a web server. Inside a LAN that gives you a great deal of power. Between LANs it can also be a real shot in the foot because people might start trying to send power point slides around on it EPLARS/SINGARS net which will kill it just about as fast as anything I know. But we've given everybody that capability because we know the future is not everybody having a Sun Sparc 20 . Once you LAN and once you get the tactical internet sorted out, I can tell you right now the CHS2 family of computers will start to include 486's because you won't need to have all that power if all you are is a client and especially if you're on

LAN. We can save -- I think the cheapest CH2 suite is $17,000. You can buy a lot of computers for $17,000.

That's what I've got. And I'll answer all kinds of questions, I'm sure, during the day.

Annex C
Slides from Opening Comments

Annex C Appendix 1
MG Rigby's Slides from Opening Comments

DIGITIZATION OVERVIEW BRIEFING

Army Digitization Office

C-1-2

Force Directions in Digitization

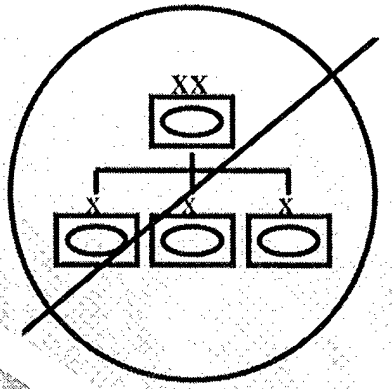
3 JUNE 1996

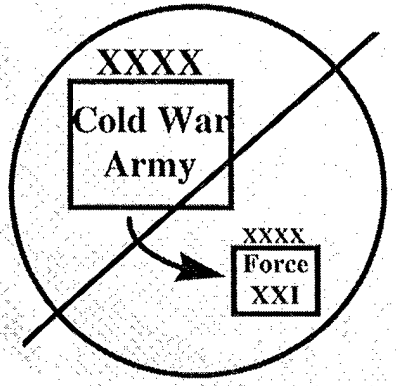
What is Force XXI?

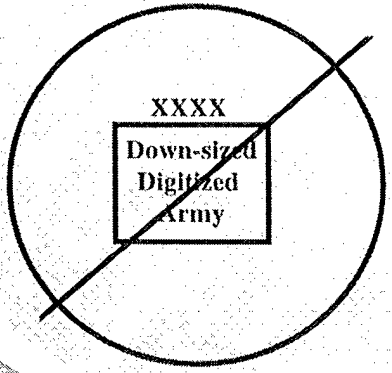
Army Digitization Office

FORCE XXI

Force XXI is not:







Force XXI is:

- America's evolving Army of the 21st Century
- A process of continuous transformation

A Journey... Not a Destination

C-13-3

"THREE AXES"

Army Digitization Office

Big "A" Army
- *TDA*
- *Title 10*

TDA / Institutional Army

Three Axes
- ***Simultaneous, interactive process***
- ***Deputy Chief of Staff for Operations and Plans(DCSOPs) will synchronize***

Joint Venture
Operating Army

FORCE XXI

Acquisition Reform must succeed
- ***Statutory***
- ***Regulatory***
- ***Policy***

Army Digitization Office

Information Technology Assimilation
Programmatics

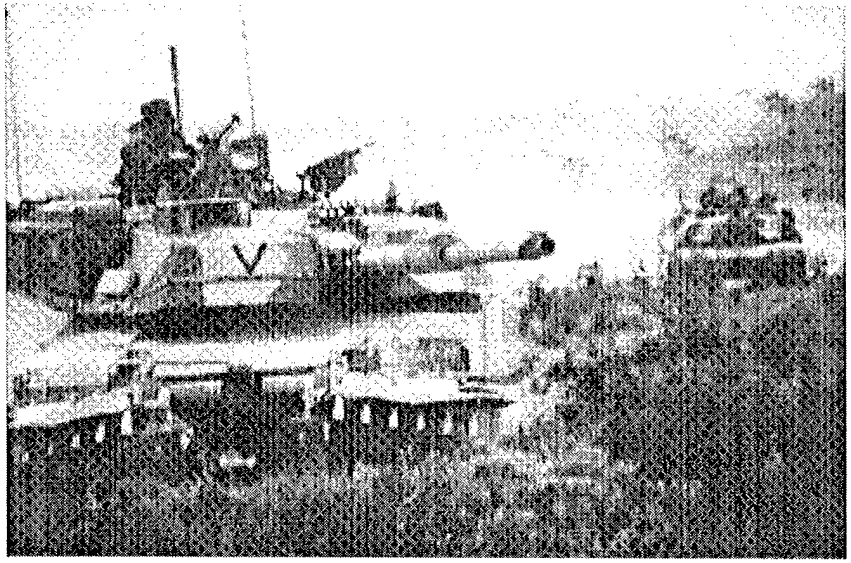
C-1-4

Joint Venture Campaign Plan

Army Digitization Office

Concept of Operations

- Initial focus will be TOE division
- Follow-on designs for echelons above and below Division....
  - Final Division design by Feb 1998
  - First applique Division by 2000
  - Field first applique Corps by 2006

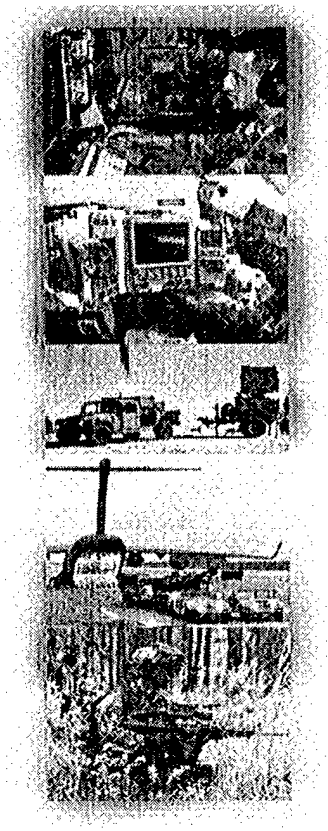


FXXI Division Design Principles:

- Optimize information-based operations
- Dominate battlespace
- Control battlefield tempo
- Mount, execute, and recover from operations simultaneously
- Be capable of quick, decisive victory with minimum casualties
- Be rapidly deployable, sustainable, and operationally agile
- Tailorability through modularity
- Divert tasks that inhibit the Division
- Be effectve in war and OOTW as part of a Joint/multinational team in all operational environments

Army Digitization Office

REQUIRED CAPABILITIES FOR THE DIGITIZED BATTLEFIELD



5 Broad Categories

- *Integrated Battle Command From Platoon to Corps*
- *Relevant Common Picture of Battlespace at Each Level*
- *Joint Interoperability at Appropriate Echelons*
- *More Responsive Logistics Within and Between Theaters*
- *Enable Smaller Units to Be More Lethal and Survivable*

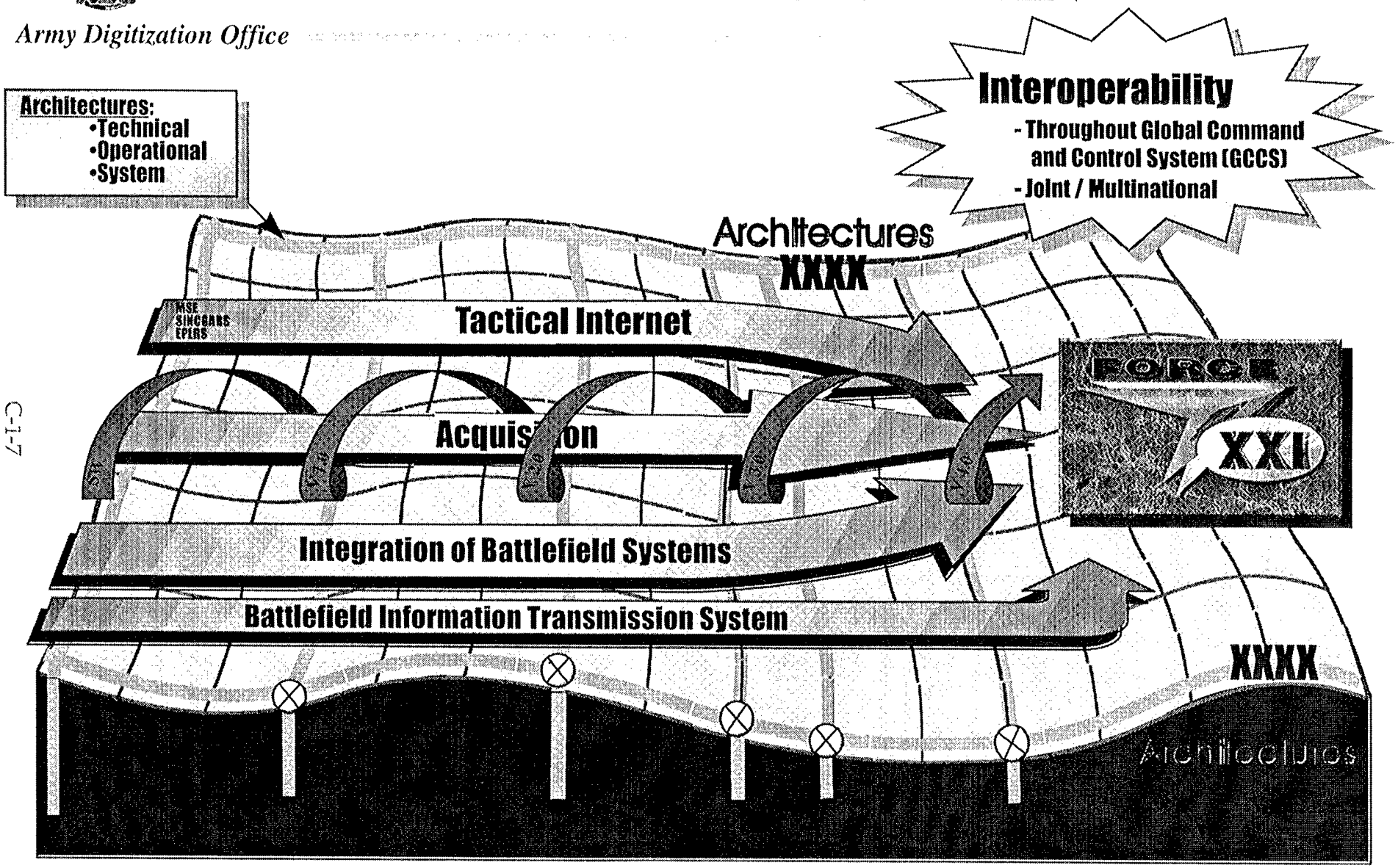
Exploit state-of-the-art communications, sensors, space-based resources and computing systems to provide the Army with the technical advantages needed to meet the battlefield C2 challenges for the 21st century.

JROC Approved MNS on 10 JAN 95

C-1-6

ADO CAMPAIGN PLAN

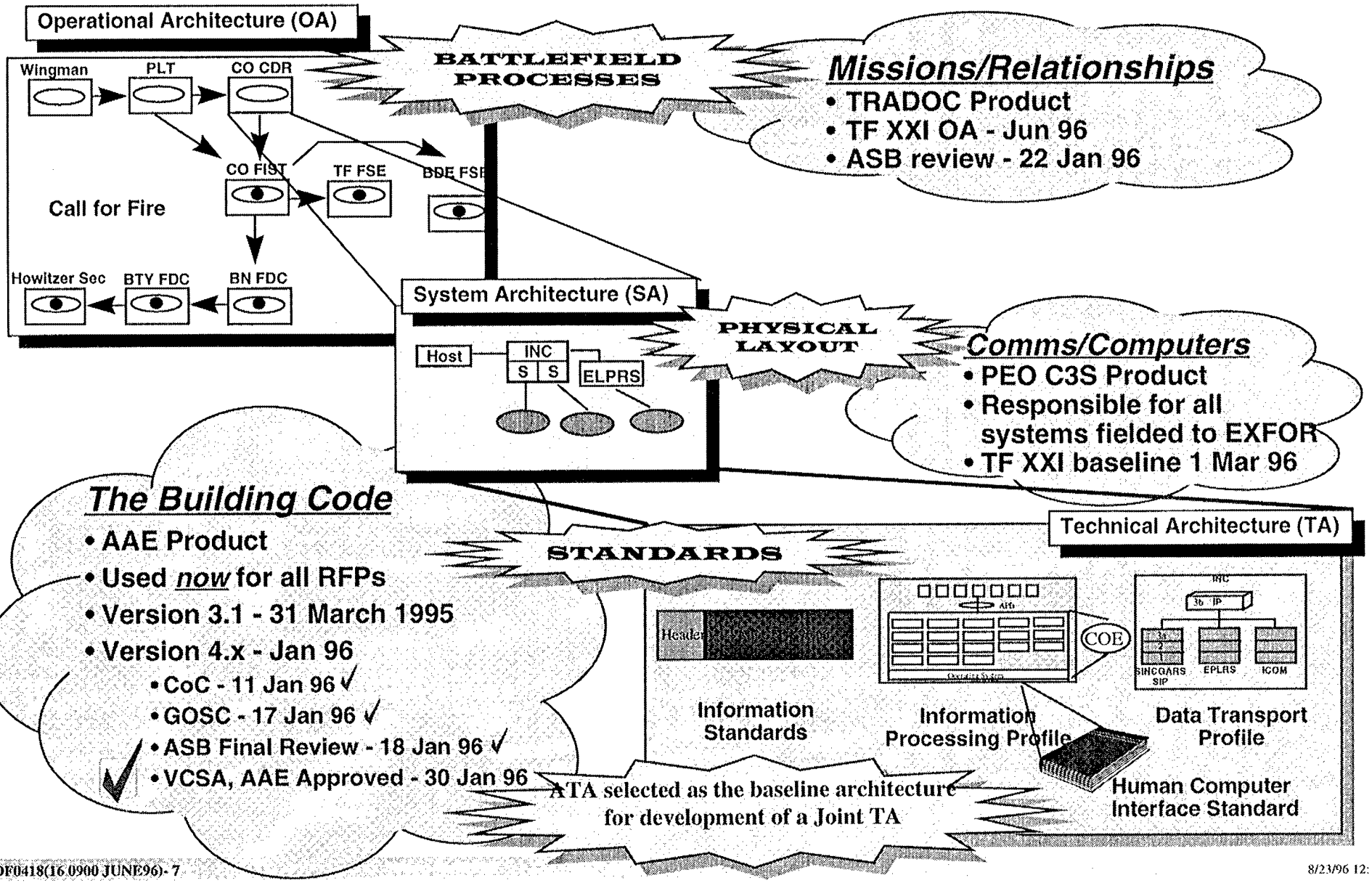
Army Digitization Office



Experimentation & Evaluation

Architectures for Force XXI

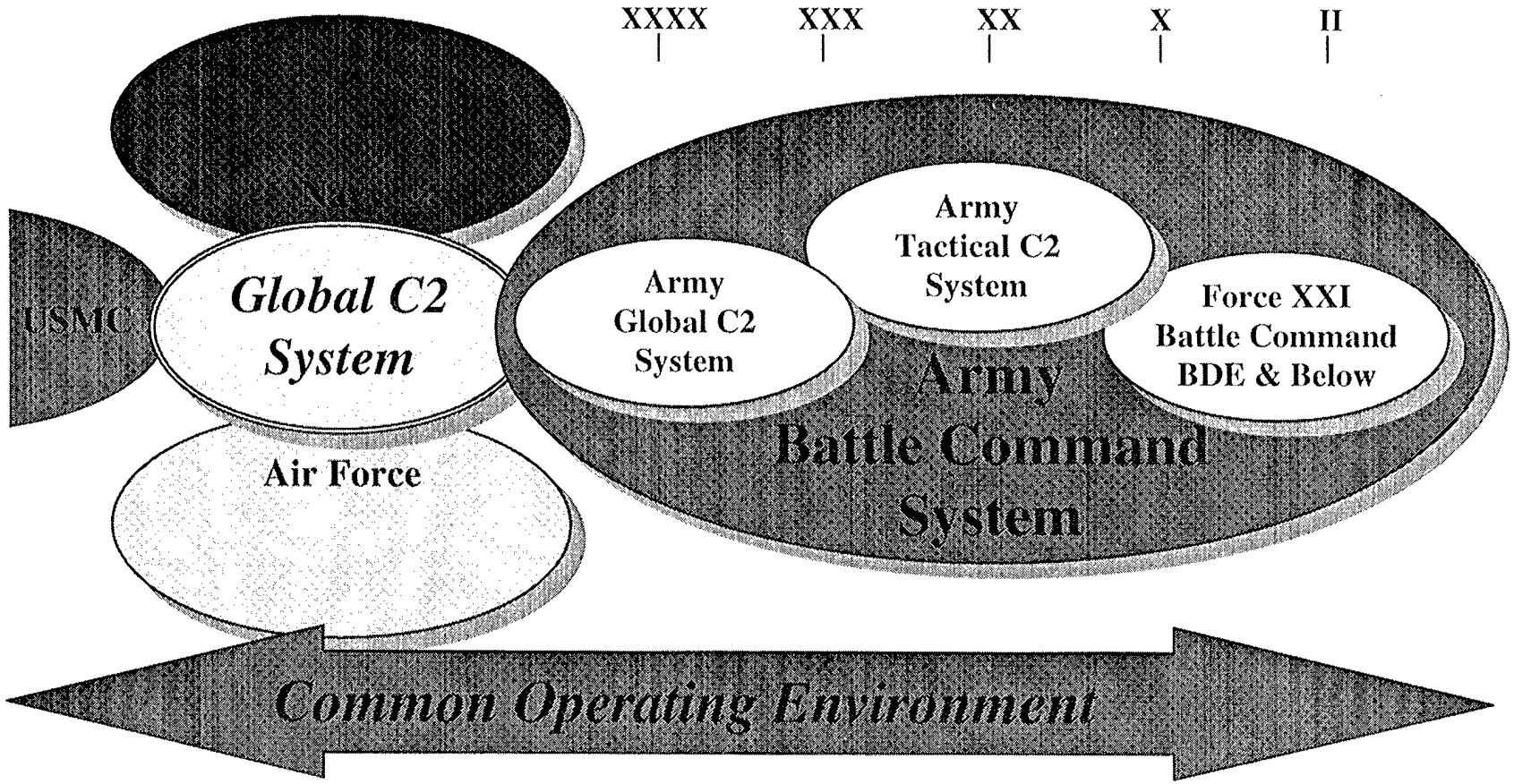
Army Digitization Office



C-1-8

ARMY C4I ARCHITECTURE

Army Digitization Office

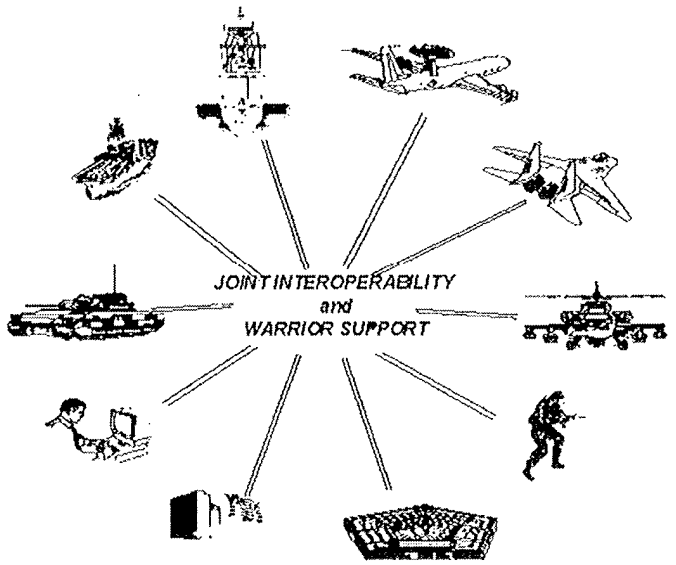


- DoD TECHNICAL ARCHITECTURE
- OPEN SYSTEM ENVIRONMENT
- COMMERCIAL STANDARDS & PROTOCOLS

Joint Technical Architecture (JTA)

Army Digitization Office

- Army Technical Architecture selected as the starting point for the Joint Technical Architecture in Dec '95
- DISA has OSD lead with strong Service participation
  - DISC4 has Army lead
- Scope initially focused on C4I systems
- Version 0.5 (Preliminary Draft) just released for public comment
  - Closely parallels Army Technical Architecture
  - Changing rapidly
- Finalize and obtain approval of JTA - July 96
- No major ATA impact currently expected



C-1-10

Migration to the Army Technical Architecture

Army Digitization Office

POM 98-03

Systems supported for ATA Migration:

M2A3 BRADLEY	CHS	ASAS
IDM	FAAD C2	ISYSCON
AH-64D	JSTARS	Crusader
OH-58D	A2C2S	TPQ 37
LAND WARRIOR	PATRIOT	TPQ 36
PALADIN	MLRS IFCS	Corps SAM
BREACHER	JTAGS	
THAAD		
M1A2 SEP	C2V	RAH 66
MCS/P	Applique	CSSCS
AFATDS	Javelin	

2006

PROPOSE ALL ARMY SYSTEMS MIGRATE TO ATA/JTA

POM 98-03 COMPLIANCE BY

Migration Plan Summit Held 22 Feb 96

Army Technical Architecture version 4.0 Approved 30 Jan 96 by AAE + VCSA

Migration to Technical Architecture Facilitates:

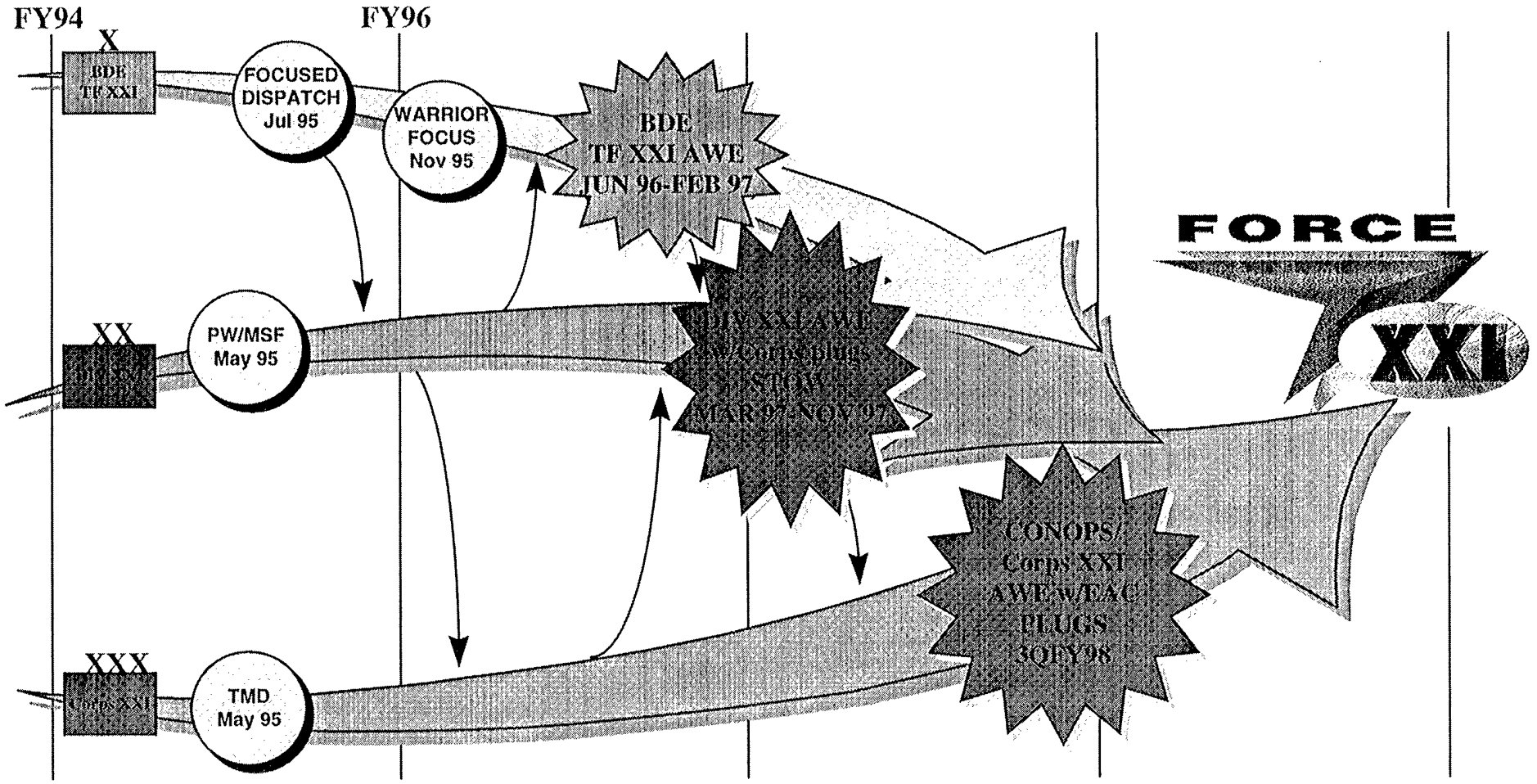
- *System Interoperability*
- *Reduction in number of separate systems through software portability*
- *Cost reduction through:*
  - *Use of COTS products*
  - *Software re-use*
  - *Training simplification*

C-11-11

JOINT VENTURE EXPERIMENTATION PLAN

Army Digitization Office

ROLLING BASELINE



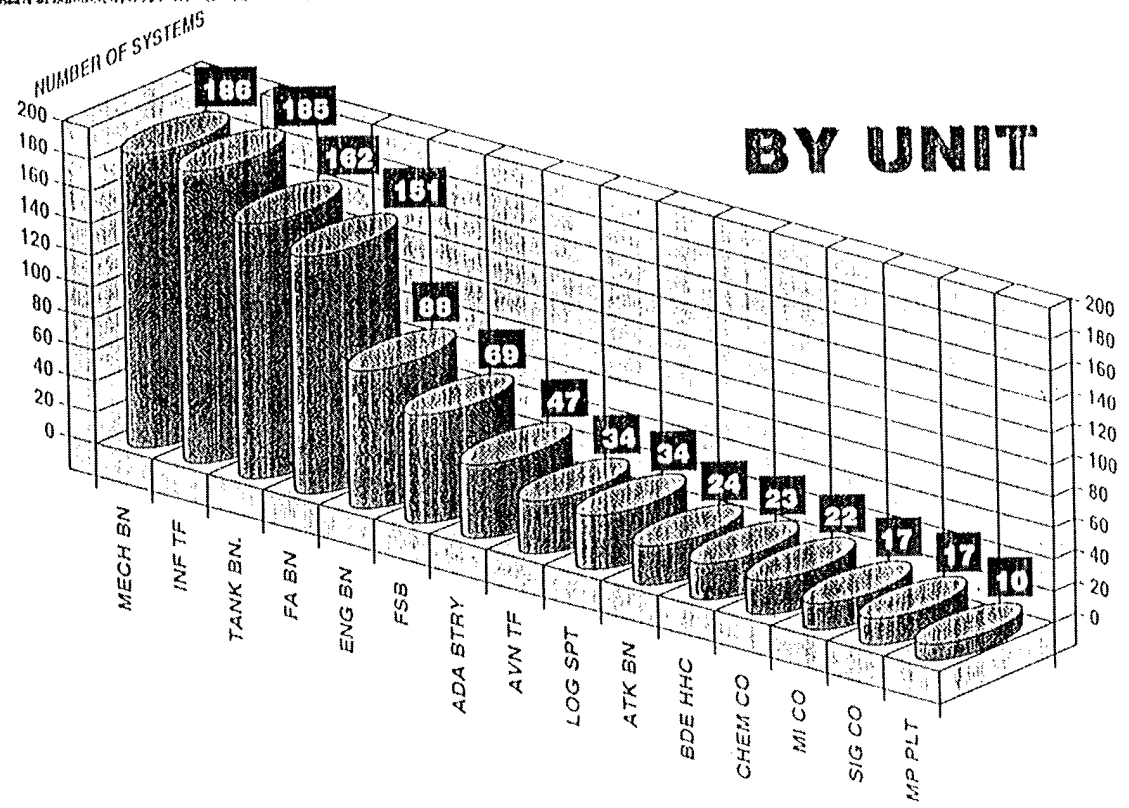
AWE = Advanced Warfighting Experiment
CONOPS = Continuous Operations
EAC = Echelons Above Corps
STOW = Synthetic Theater Of War

EXFOR Digitized Platforms

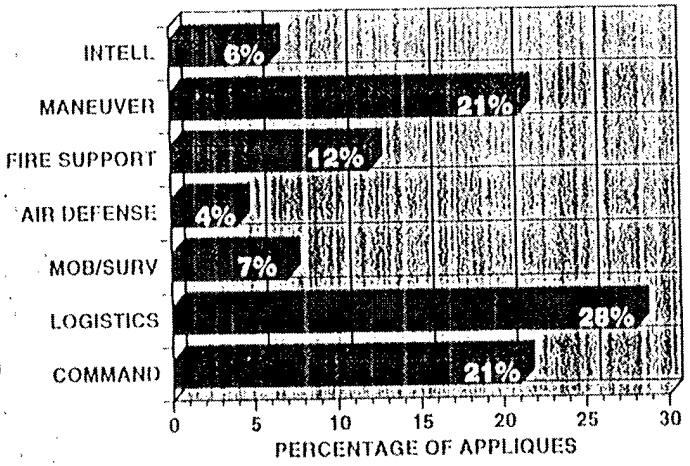
Army Digitization Office

TASK FORCE XXI

BY UNIT

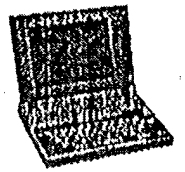


BY BOS



1069 Digitized Platforms

BY SYSTEM

V3	V2	V1	DSSU*
			
53	425	165	479

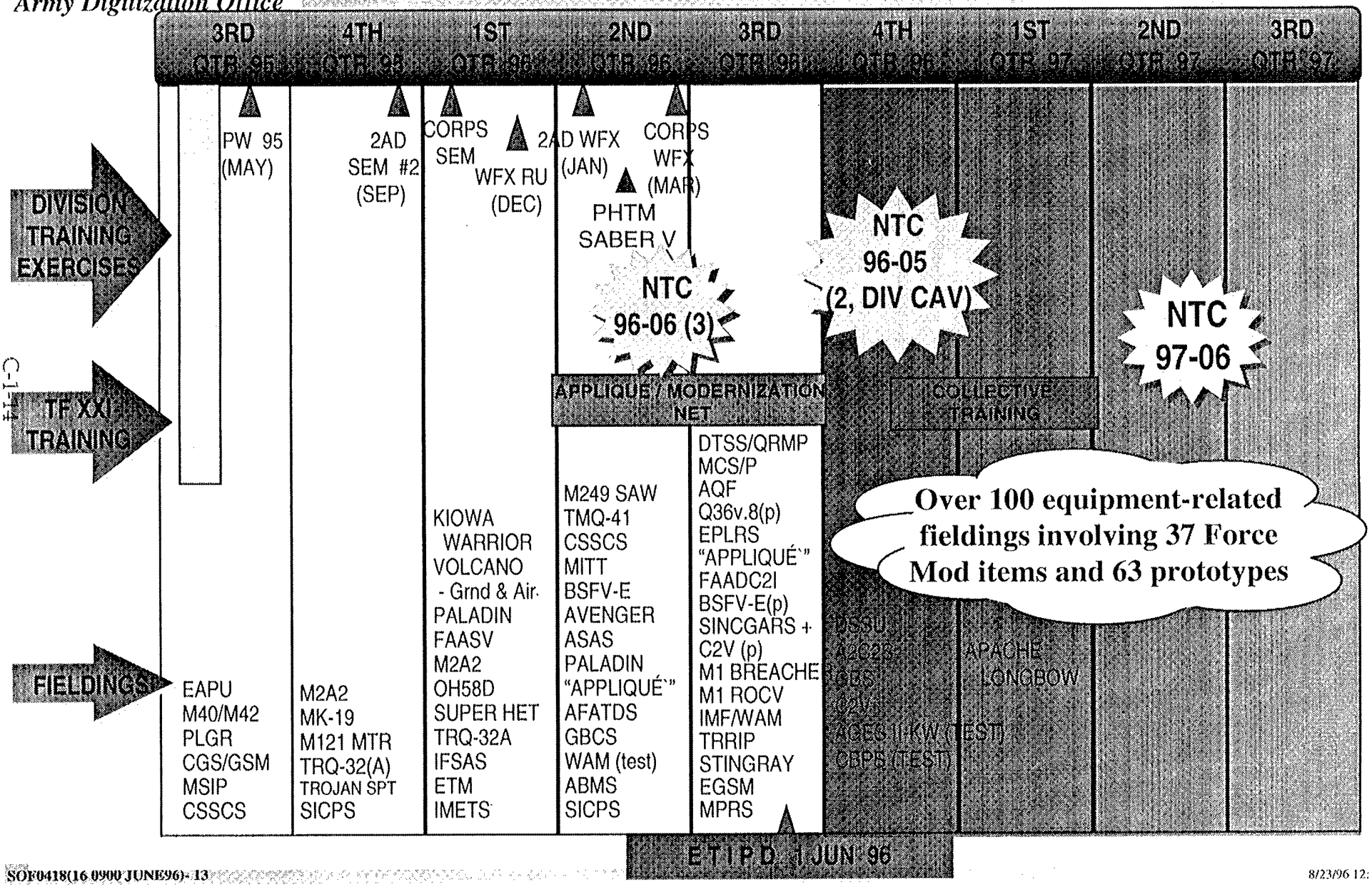
*= 240 Pos/Nav Devices (PND), 186 DSSU, 53 RDT

C-1-12

3/1/96 11:32 AM

Fielding Summary

Army Digitization Office

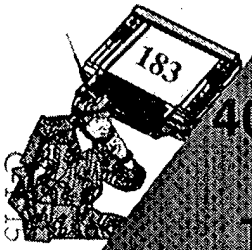


C-144

DIGITIZING THE FORCE

Army Digitization Office

862 APPLIQUÉ
832 PLGR
336 EPLRS VHSIC
1550 SINCGARS SIP
68 BCIS

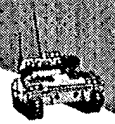


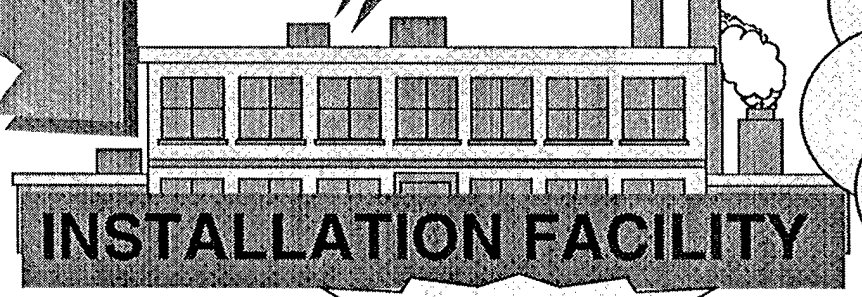
40 VEHICLE TYPES TOTALING

862 VEHICLES

145 DAYS

175 CONFIGURATIONS



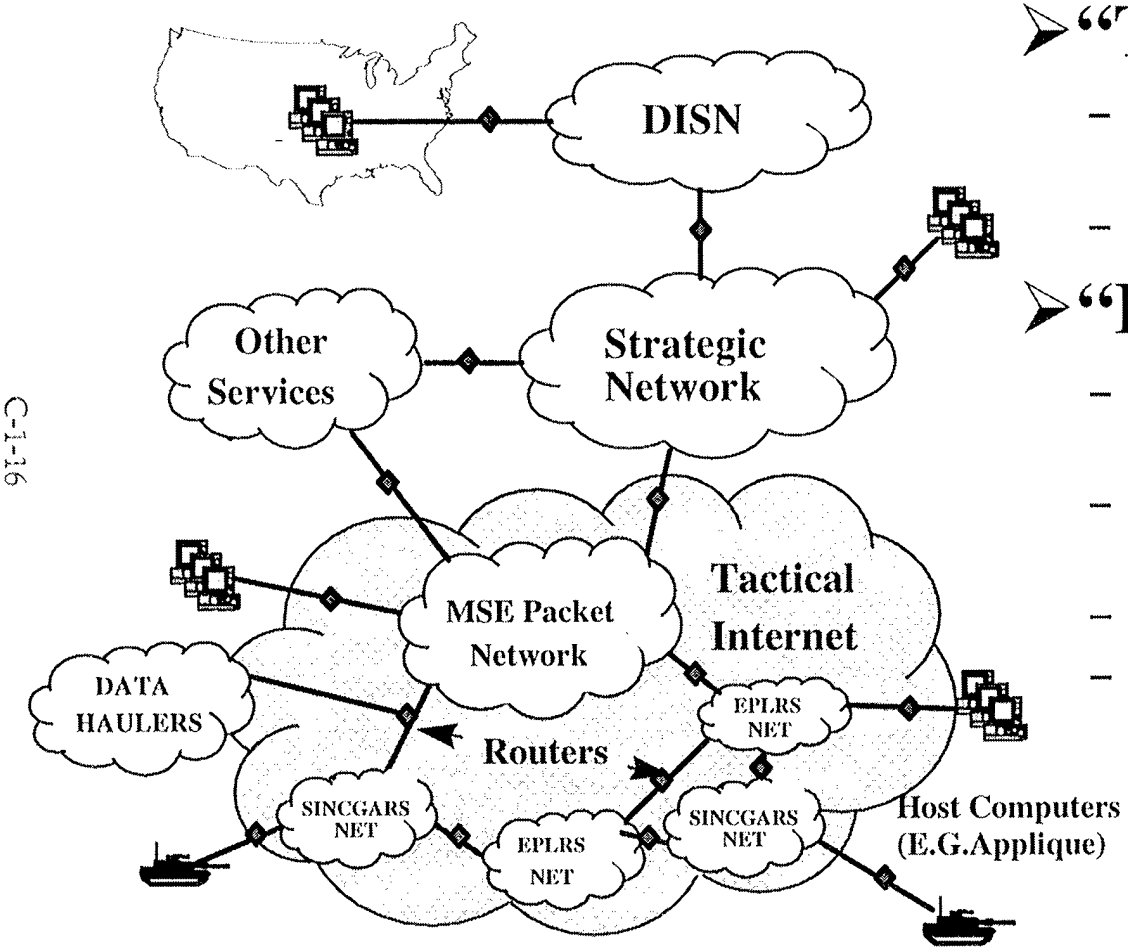


Load V1.0 software

Applique IKs
862 Platforms
4622 Cables
6601 Brackets

Because UDLP has not met IK production schedule
- Potential violation of ETIPD
- Five of 28 vehicle types may not make 6 May on-platform training start date
- Slips may cause conflict with other scheduled training

Tactical Internet



- **"Tactical"**
  - Data Communications infrastructure at Corps and below
  - Gateways to strategic levels
- **"Internet"**
  - Uses the "Internet Protocol" (IP) suite for seamless communications
  - Uses de facto commercial network standards/products
  - Dynamically routes Data to Hosts
  - Facilitates technology insertion

C-1-16

INTEGRATION OF BATTLEFIELD SYSTEMS

Army Digitization Office

SEAMLESS INTEROPERABLE C2 FROM PLATFORM TO SUSTAINING BASE!

AGCCS

ATCCS

C2 Systems

Force XXI Battle Command, Brigade and Below (FBCB2)

Embedded Systems

M1A2, M2A3, Longbow, etc.

Force XXI Battle Command, Brigade and Below (FBCB2)

Non-embedded Systems

Applique on M1A1, M2A2, etc.

Migration to Interoperability

- *Technical Architecture Compliance*
- *DII Common Operating Environment*
- *Common C2 Software*
- *VMF Messages*
- *Integrated data communications w/ COTS-based network HW, SW, & Protocols*

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International Command and Control Systems Interoperability Project (IC2SIP)

Army Digitization Office

Why IC2SIP?

Coalition TFs - No Digital Interoperability

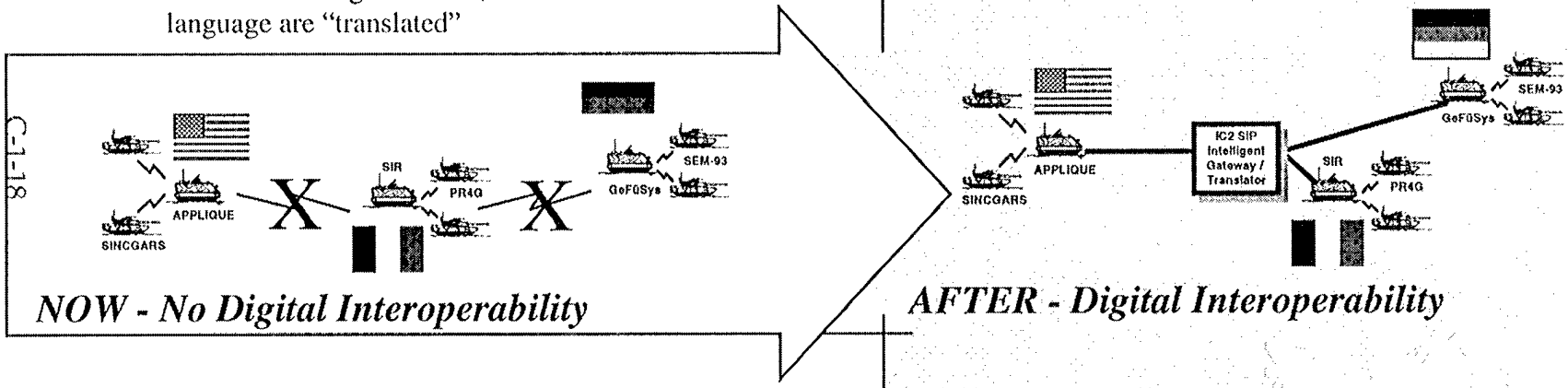
HOW?

Innovative New Approach:

- Armies perform the same basic mission functions
- National Message Formats, data formats & language are "translated"

GOAL: A Virtual seamless Coalition C2 Net

- Connects real digital C2 systems:
  - *National Combat Net Radios*
  - *Use National Messages*



Players

1996 1995 1995 1995

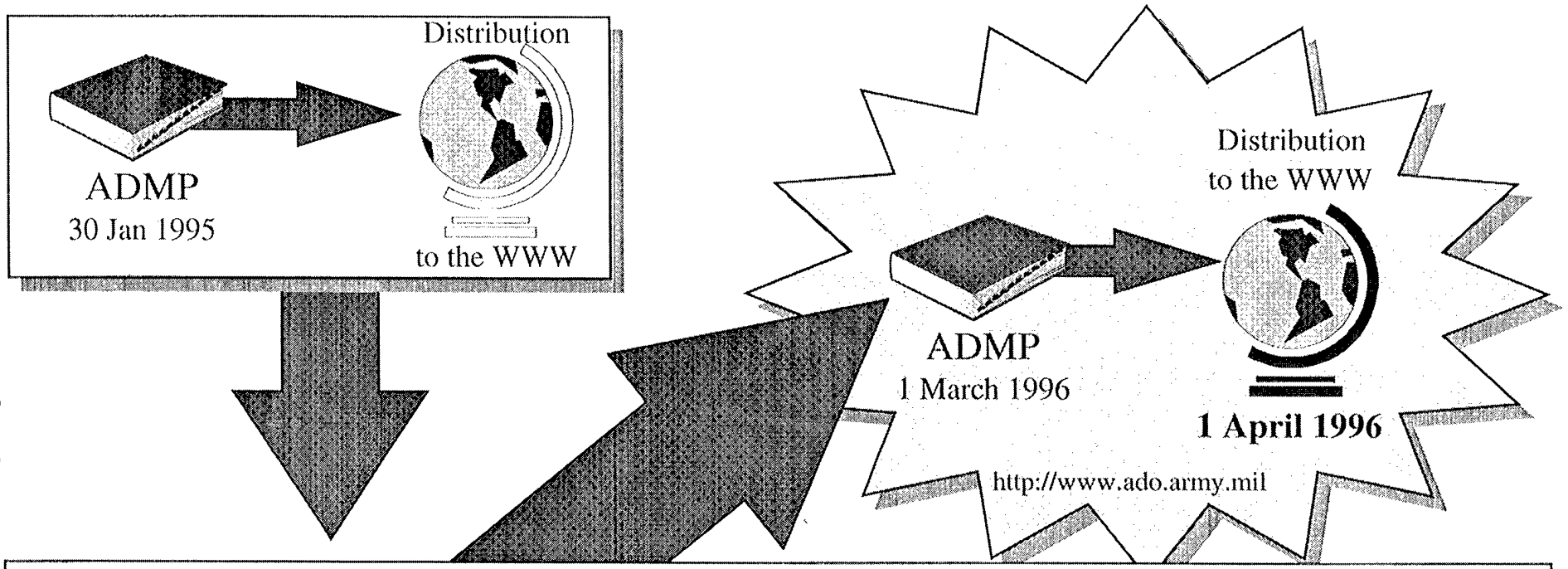
IC2SIP Field Demo

Germany 1997

- **Field environment in Germany - 1997**
- **Series of operational vignettes**

Army Digitization Master Plan

Army Digitization Office



- Establishes the overall strategy for achieving battlespace digitization
- Defines the migration plans of individual battlespace systems to the Defense Information Infrastructure Common Operating Environment(DII COE)
- Incorporates the approved version of the Army Technical Architecture
- Updates the acquisition strategy
- Defines current joint and multinational efforts toward interoperability
- Crosswalks digitization goals to specific AWEs
- Outlines security initiatives with emphasis on Red Teaming.

Force XXI... A Decisive Force

Army Digitization Office

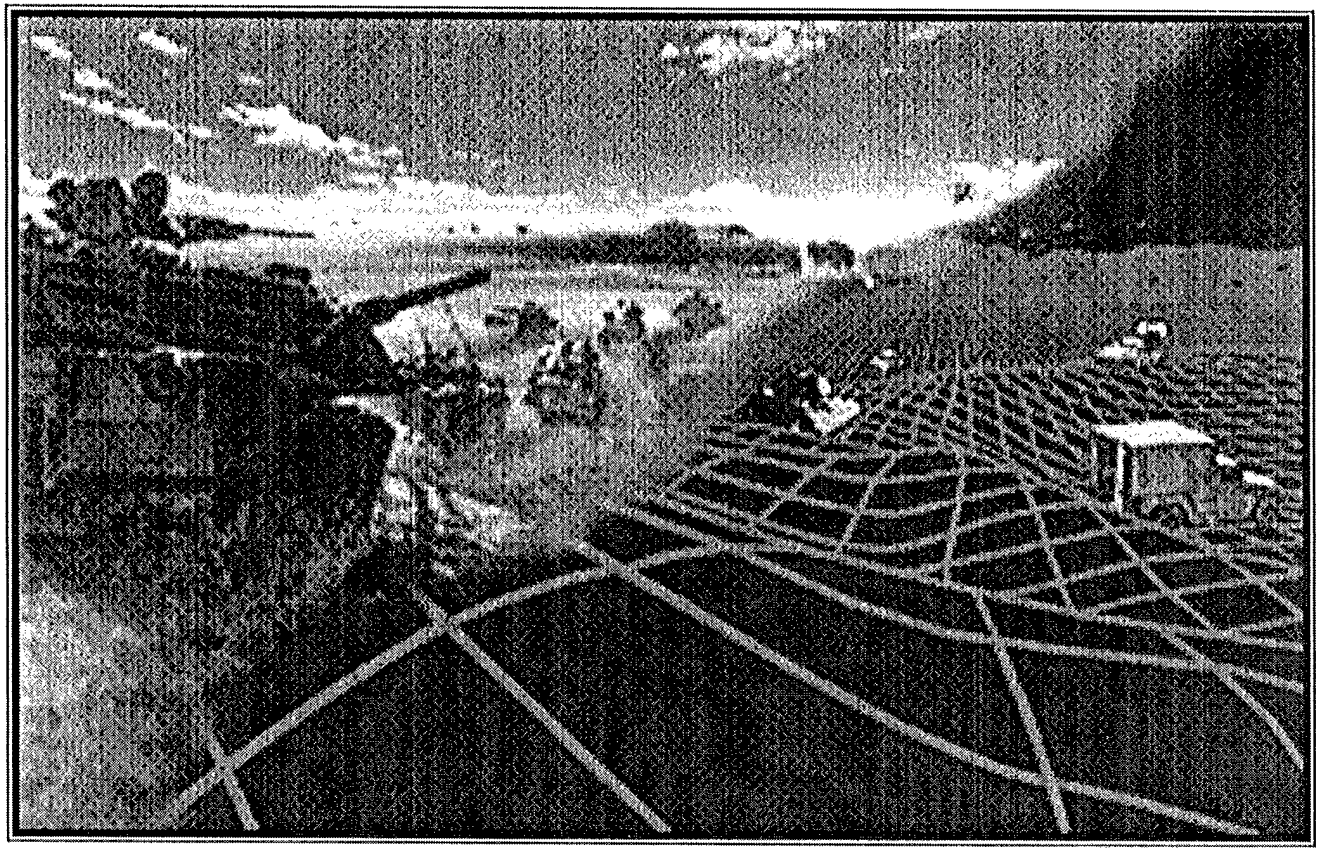
"... you can fly over a land forever; you may bomb it, atomize it, pulverize it and wipe it clean of life-- but if you desire to defend it, protect it, and keep it for civilization, you must do this on the ground, the way the Roman Legions did, by putting your young men into the mud."

T.R. Fehrenbach, This Kind of War

C1-20

Force XXI

Army Digitization Office

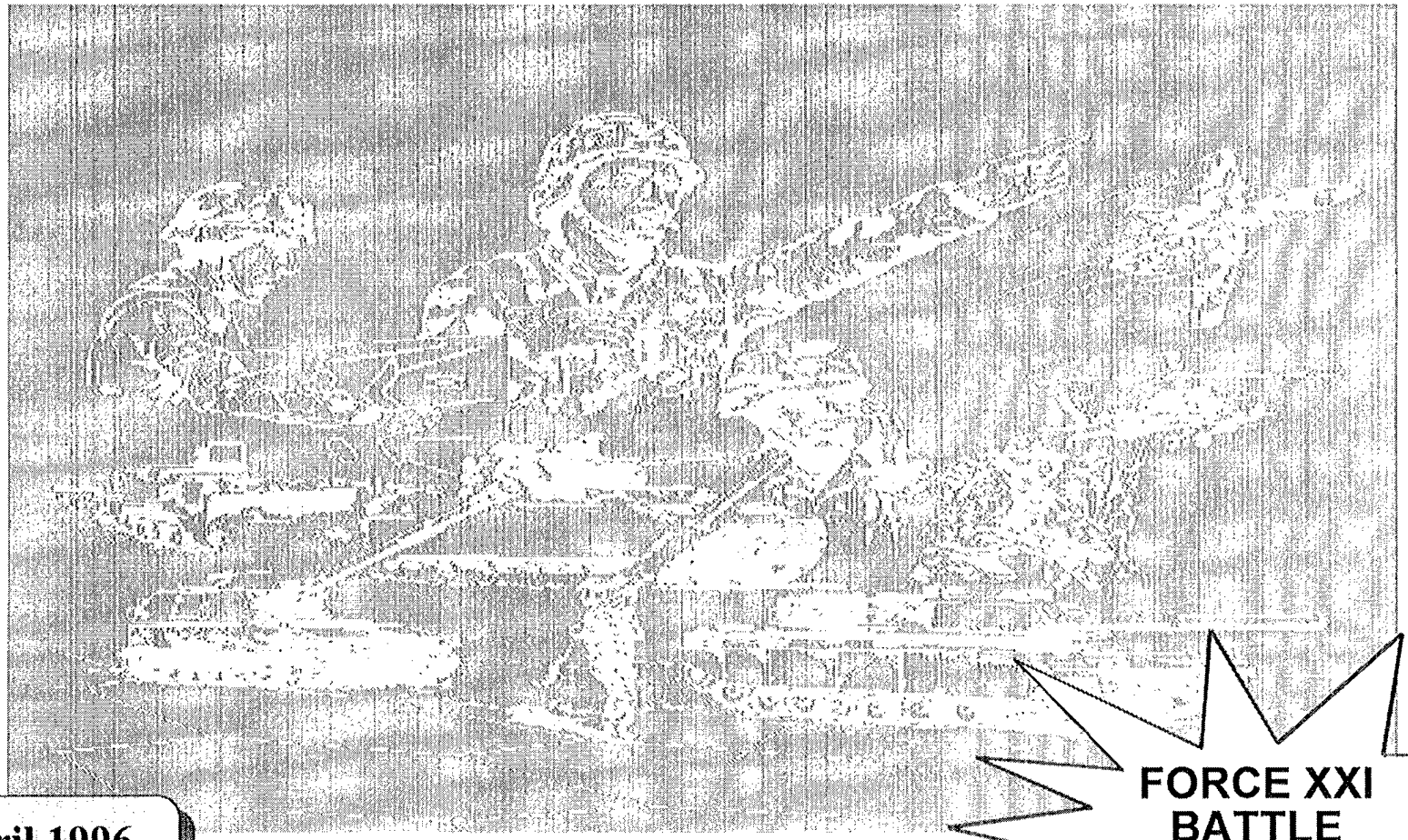


C-1-21

First on the Digital Battlefield

Annex C Appendix 2
BG(P) Ohle's and COL Baribeau's Slides from Opening Comments

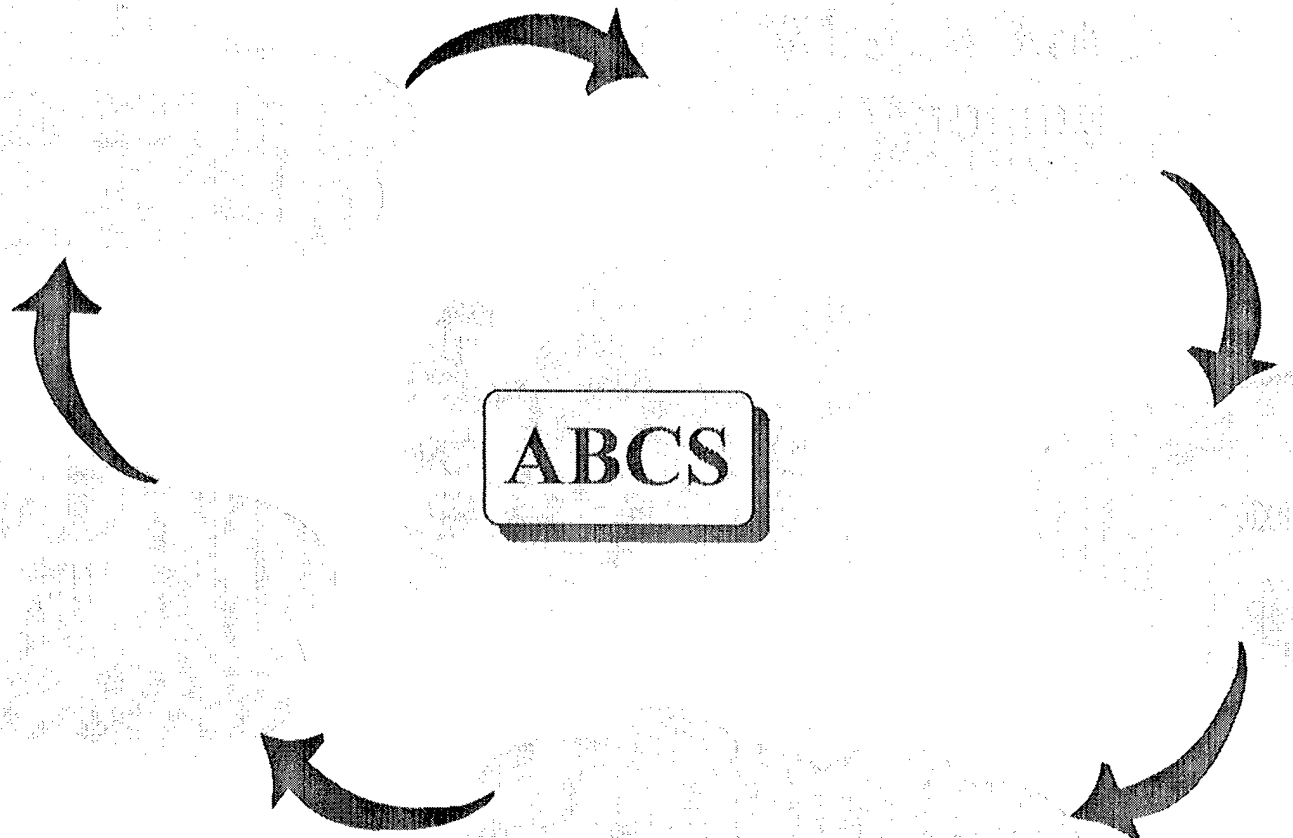
Army Battle Command



FORCE XXI BATTLE COMMAND

22 April 1996
West Point
BG (P) OHLE

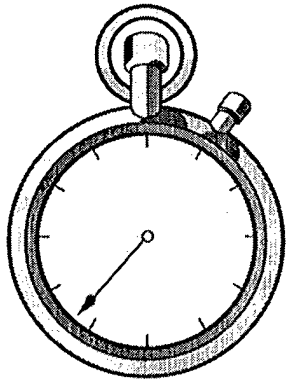
Battle Command



Time and Command

REVOLUTION
Observe: Telescope
Orient: Weeks
Decide: Months
Act: A Season

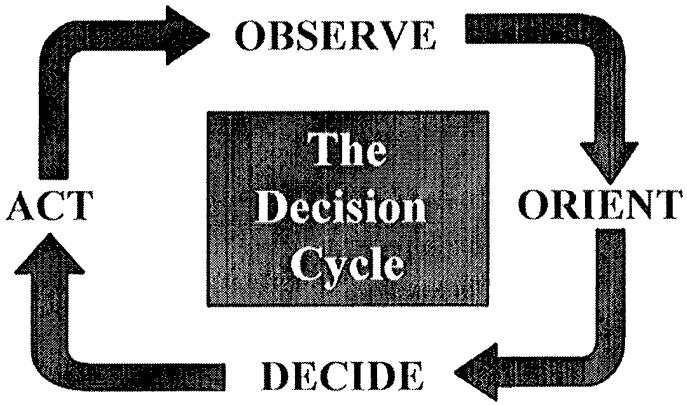
CIVIL WAR
Observe: Telegraph
Orient: Days
Decide: Weeks
Act: A Month



TOMORROW
Observe: Real Time
Orient: Continuous
Decide: Immediate
Act: Hour or Less

WORLD WAR II
Observe: Radio/Wire
Orient: Hours
Decide: Days
Act: A Week

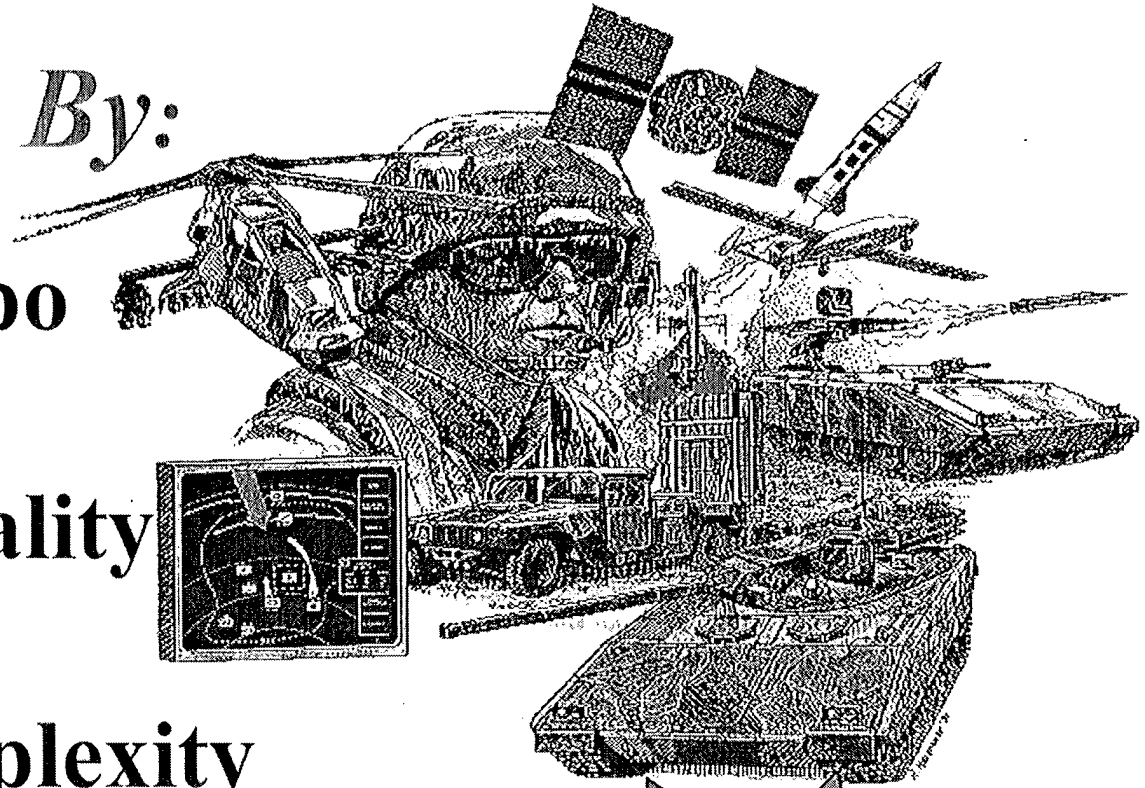
GULF WAR
Observe: Near Real Time
Orient: Minutes
Decide: Hours
Act: A Day



Future Battles

Characterized By:

- **Increased Tempo**
- **Increased Lethality**
- **Increased Complexity**

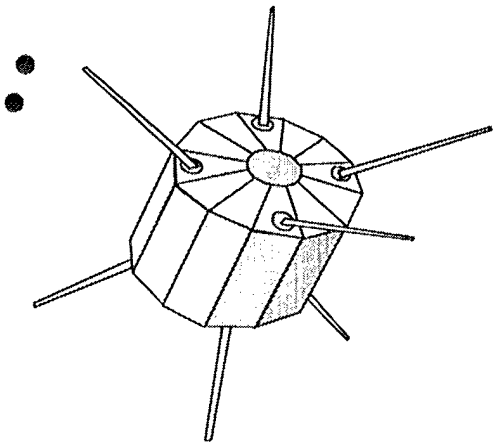


WE must:

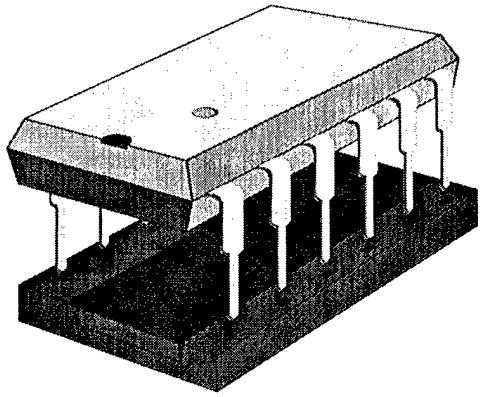
Win decisively with a minimum of casualties

Leveraging Technology

Leverage technology to :



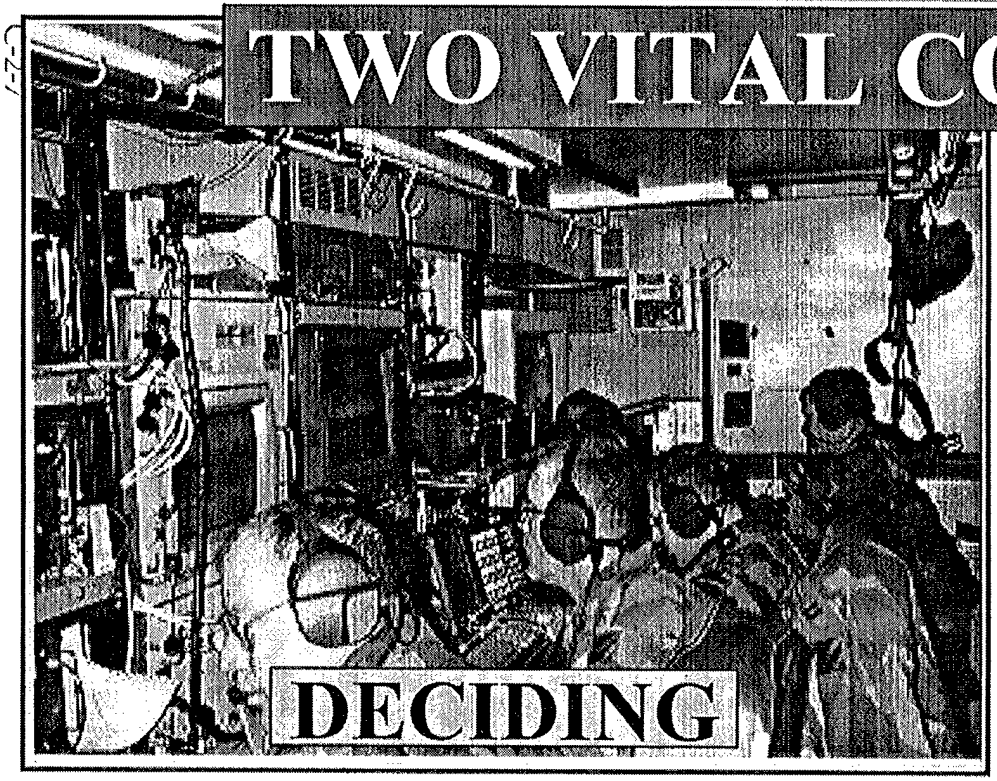
- **Control the tempo**
- **Enhance lethality & survivability**
- **Reduce ambiguity**

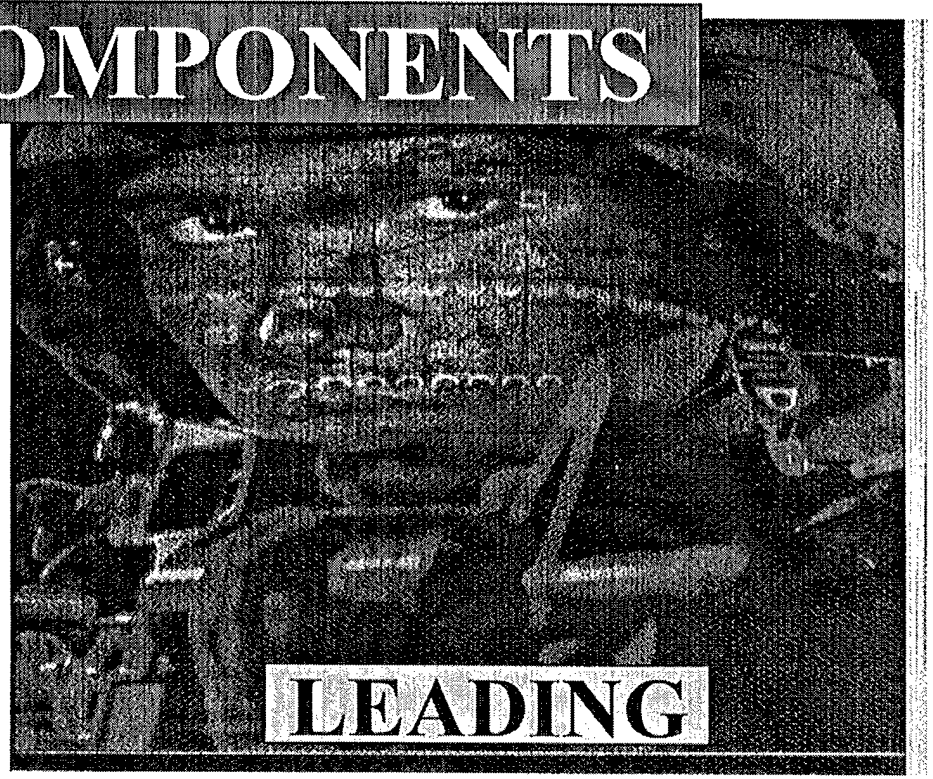


Battle Command FM 100-5

Battle Command: The art of battle decision making, leading, and motivating soldiers and their organizations into action to accomplish missions.

TWO VITAL COMPONENTS





C-27

Battle Command

ART

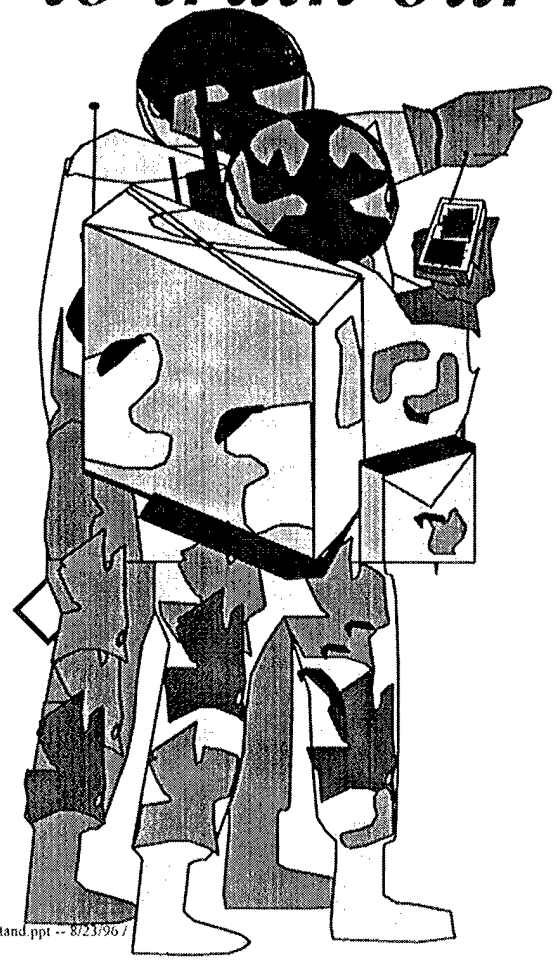
- Presence
- Sensing
- Experience
- Judgment
- Intuition

MEANS

- Collecting
- Processing
- Disseminating
- Protecting
- Presenting

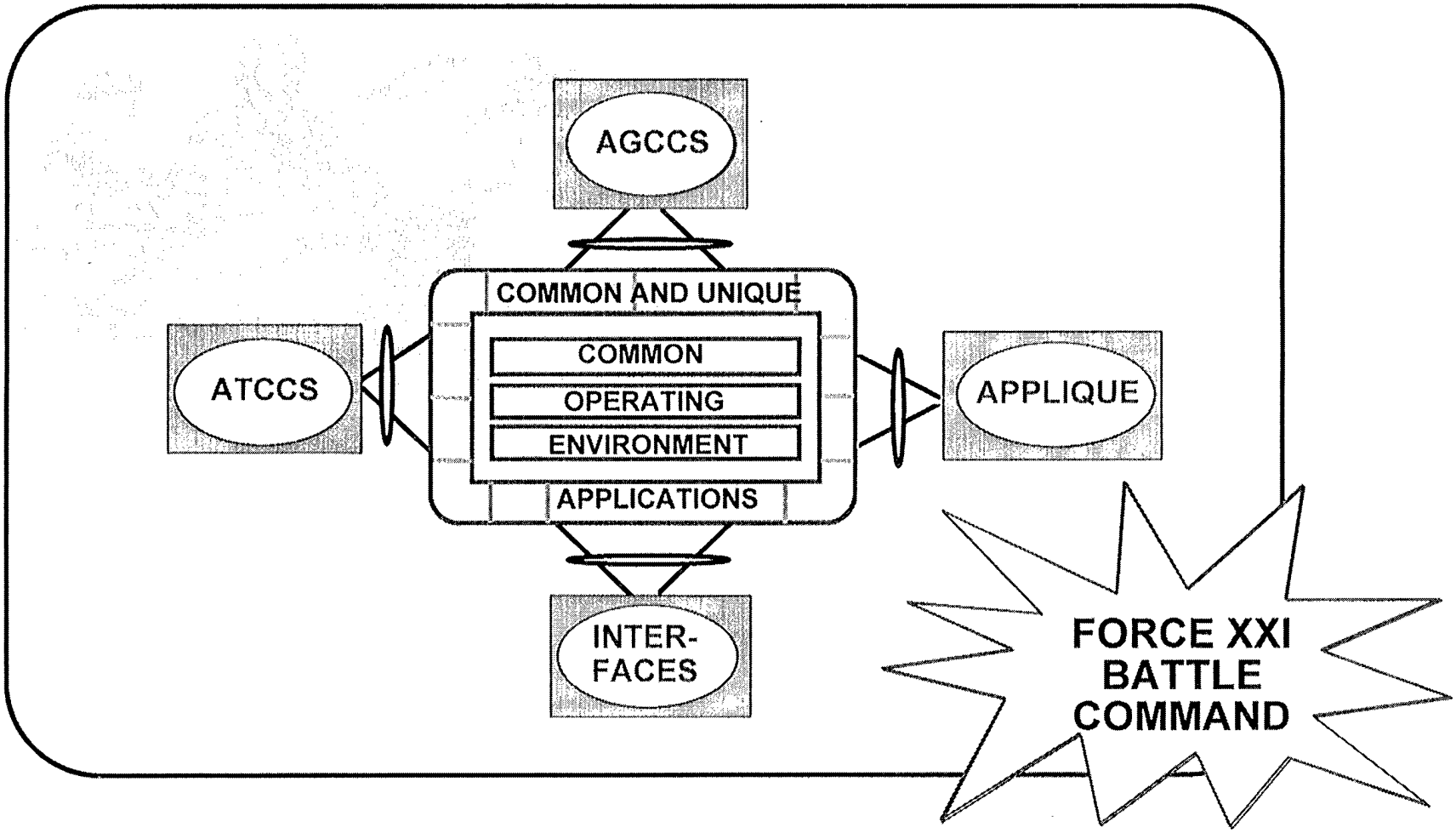
Battle Command Objective

The Challenge today and tomorrow is to train our leaders to :



- ★ **See Themselves**
- ★ **See the Enemy**
- ★ **See their End State**

Army Battle Command System
The Means



Why ABCS

♦*ABCS gives Battle Commanders the ability to:*

♦Clearly see and understand the Battlespace

♦Communicate his intent

♦Develop/Issue orders

♦Synchronize the Force

♦Perform On-the-Move

- **Information is the "High Ground"**
- **FORCE XXI Battle Command demands, Commercially based, open architecture, distributed computing environment (DCE) system**
- **Automated decision tools with near-real-time fused realistic common picture/battlefield visualization is not possible with current systems**
- **Interoperability among services requires a single Joint Compliant interface and data standards (DII-COE)**
- **Cannot afford eight separate systems--must move towards a single system architecture digitally integrated**

What ABCS must do....

CRITICAL SYSTEM REQUIREMENTS

- **A "Seamless" architecture**
- **Compliance with DoD standards and protocols**
- **Functional requirements stated in component documentation remain valid**
- **Provides flexible access to the FLI database**

Army Battle Command System

SYSTEM PERFORMANCE REQUIREMENTS

- **"On The Move" capability where required.**
- **ABCS will use fielded major strategic and tactical communications**
- **Will host modular applications software, new software releases as developed**
- **Operable by personnel under full MOPP 4 conditions.**

Cold War to ABCS

Cold War:

- **Automated systems each supporting a BFA**
- **Connectivity vs Interoperability between BFAs**
- **Hierarchical information flow**
- **Large, static CPs**
- **Large staffs**

Stove Piped System

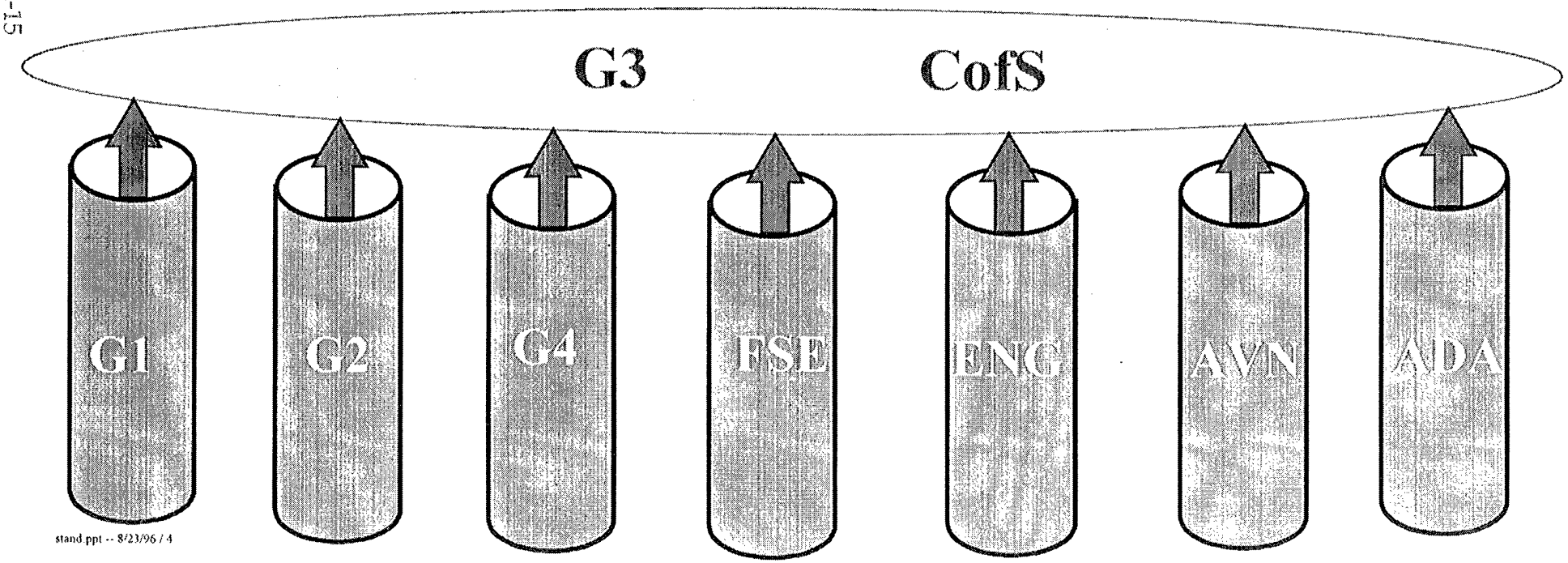
Joint Operation Planning
& Execution System

Quick Decision Making

Combat Decision Making

Deliberate Decision Making

CDR



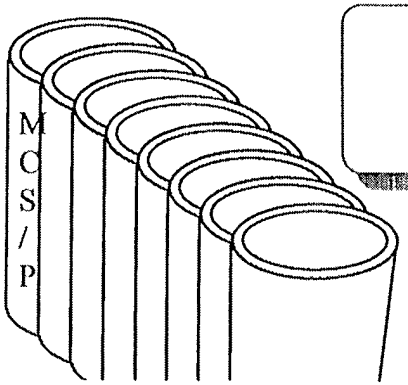
Future

- Warfighters linked via satellite-based networks
- Sensors to shooters
- Integrated digital info system -- horizontally and vertically linked
- Command-centered automated decision tools
- Near real time fused common picture
- C2-on-the-move

ABCS gives Battle Commanders the ability to:

- Clearly see and understand the Battlespace
- Communicate his intent
- Develop/Issue orders
- Synchronize the Force

MCS/ABCS Summary

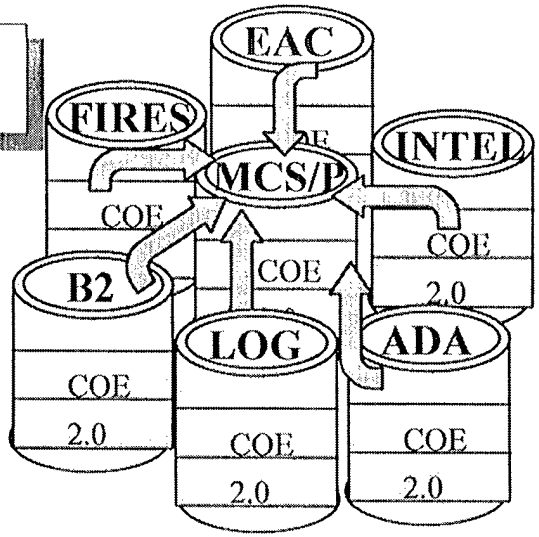


BATTLEFIELD AUTOMATED SYSTEMS

PRESENTLY

NEAR TERM
FEB 96-FEB 97

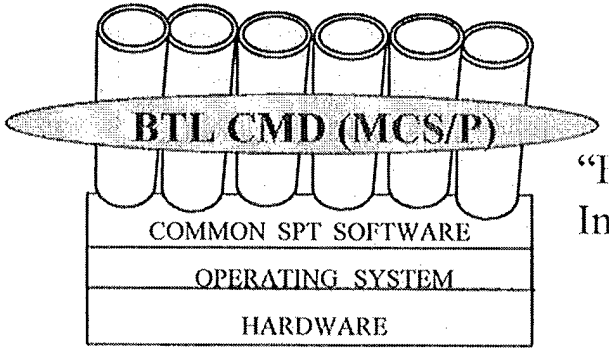
- III Corps
- COE/MCS Core (SUN/Solaris)
- Interchange - Data & Msgs



MIGRATION PATH

MID-TERM
FEB 97-JUN 98

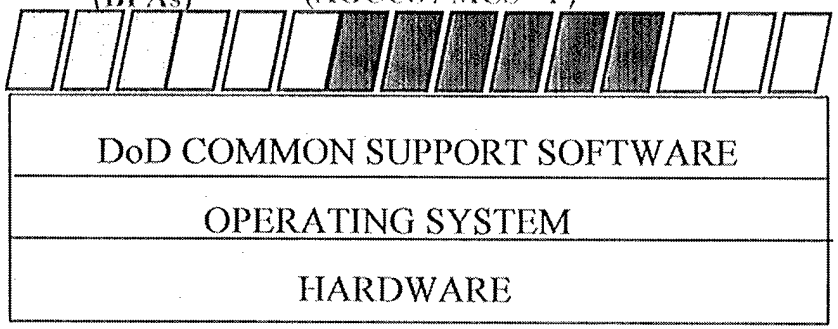
- III Corps Complete
- Data Exchange
- Joint wide-are network
- Army Modernization



"Force Level Integrator"

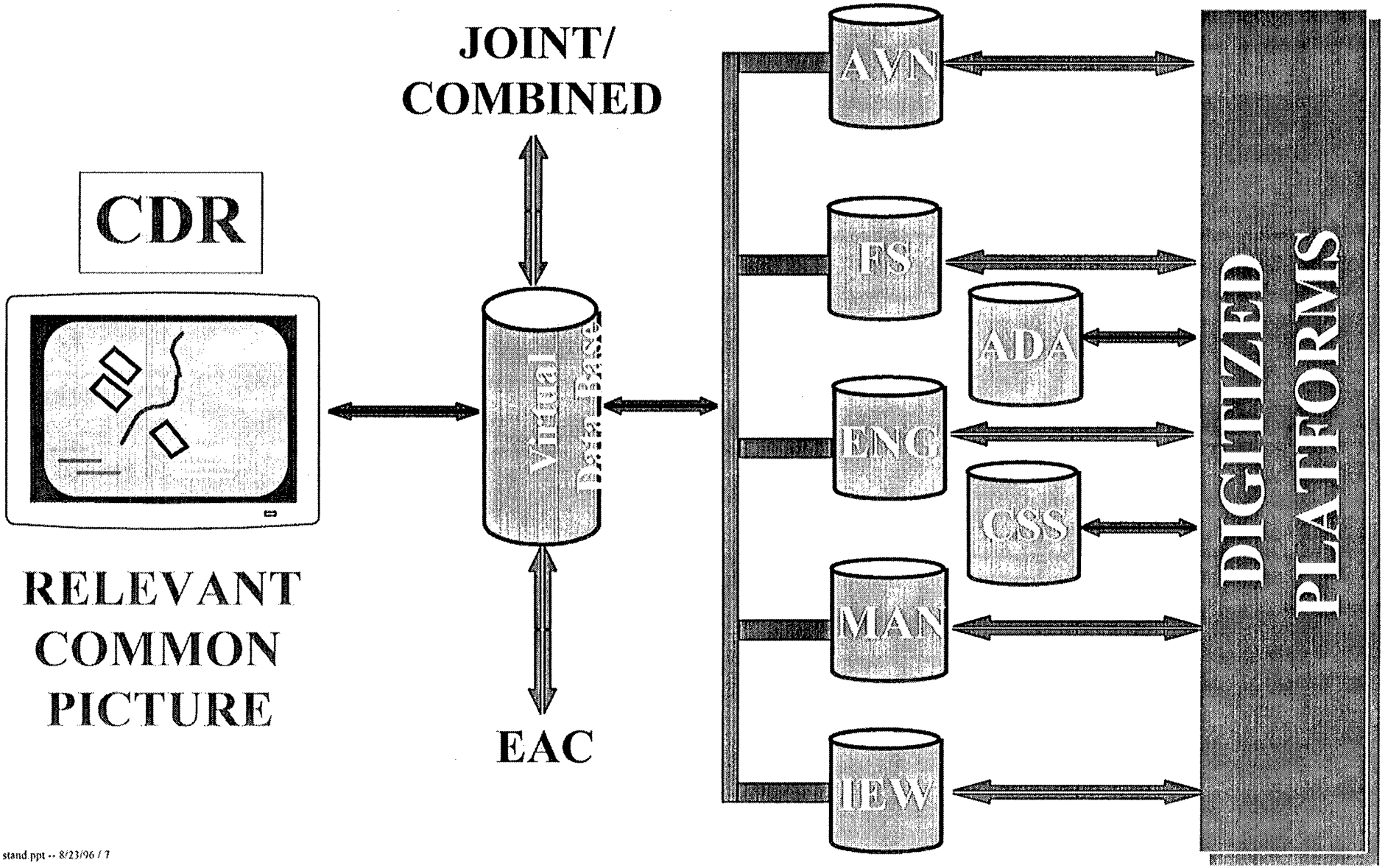
OBJECTIVE
DIV 98

UNIQUE AND COMMON APPLICATIONS
(BEAs) (AGCCS / MCS - P)

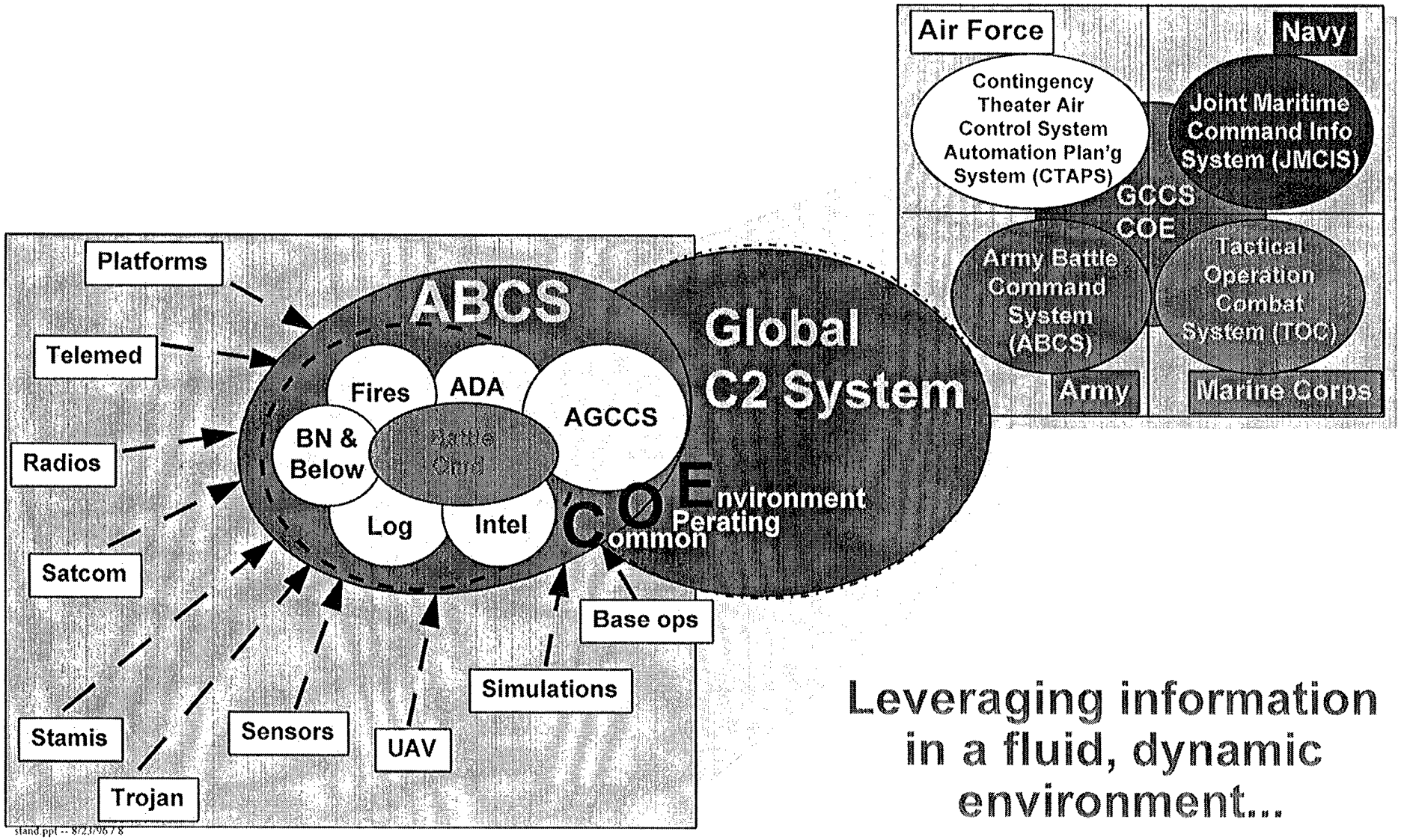


C-2-17

Functional System



ABCS -the Big Picture

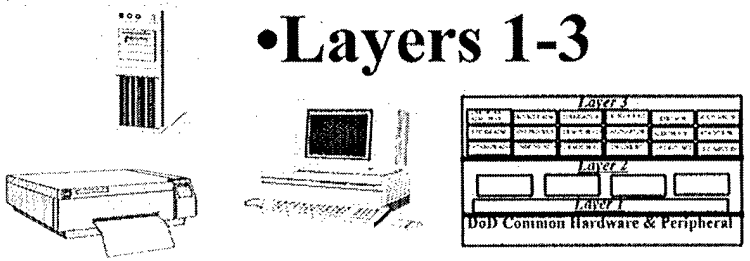


Leveraging information in a fluid, dynamic environment...

ABCS Components

Common Operating Environment (COE)

•Layers 1-3

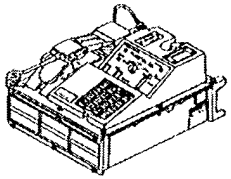


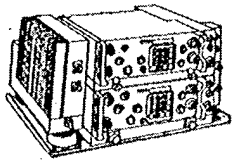
Standard Army Communications

•ACUS

•ADDS

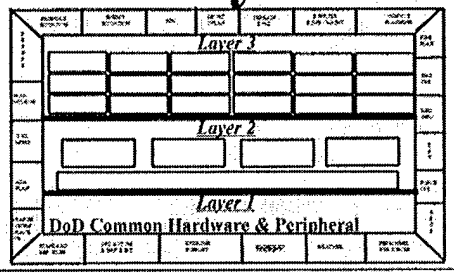
•CNR





Unique and Common Applications

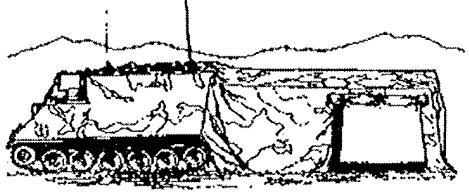
•Layer 4



Platform Systems

•SICPS

•C2V



Simulations - WARSIM/JSIMS

PW Objectives

Battlefield Visualization/C2 Integration:

- ATCCS integration
- Combat information center (CIC)
- Operations/Intel picture
- Technology enables:
  - Flat panel displays
  - C2V configuration
  - Voice configuration
  - Microsoft Windows

Annex D
Computer Output from Symposium

This annex contains the comments from the symposium participants which they input into the GroupSystems software at their workstations. The appendices are broken down into the topic areas we discussed during the day. We have formatted the appendices but not have not edited the comments. Therefore, some of the comments will have misspellings and other grammatical errors. This does not matter in GroupSystems because only the content of a comment is important.

The working sessions of the symposium were broken down into three phases. First, the participants made comments on each of the seven topic areas. Second, they placed all of the comments from the first session into at least three different categories: Unsolved, Solved and Other. Third, they voted on which topics were so important as to warrant further discussion. We present the appendices in the order in which the group ranked them.

Each appendix contains the comments made by the participants on that topic in the morning followed by the categories in which the group placed the comments. These comments appear as **bold text**. The group then made additional comments on the top three topics, Training, Leadership, and How to Fight. These first three appendices begin with the additional comments made by the group in the afternoon. This section contains the overall comments (in bold) which were made in the morning. The group then expanded on these comments in the afternoon session. The comments they made in the afternoon are in plain text.

Annex D Appendix 1
TOP ISSUE: Training (Topic Commenter)

1. Because our hardware and software will have a relatively short life (2-3 years), we seem to need to develop a training system that is much more agile and responsive than our current system. Need to make a clear distinction between education and training--making training our short term responsive to changing field needs and education long term responsive to the career intellectual needs of the force.

Agree this is an issue. System must continue to produce warriors who are also technology literate; educated on the art of war, trained on the technology to create the information needed to decisively win.

We will always be chasing technology. As soon as we get a 'version' of software or hardware, it is obsolete.
How do we fix this - tough tough problem. However, it is going to require an officer / NCO corps with enough requisite background
to be able to adapt. Changes in our development program.

We will never stop upgrading. Lets do it the same rather than ver 1 at Ft Stewart, Ver 1.1 at Fort Hood, etc. Need to be creative with this.

Agrre this is an issue should like Microsoft software goal should be to upgrade system with a new package that provides the user relatively new functions and capabilities in the same window as before.

There is a significant training development challenge to the above. Our formal TD programs are simply not agile enough to rapidly evolve. With the TD structure taken out of the force we often turn to contractors to produce training doctrine.

HW & SW acquired to support training must be the same as what is used by Army units during military operations. It is vital that the transition from the training to the operational environment is seamless.

We have to be willing to miss an upgrade in order to field capabilities and train to standard with those capabilities. If we keep trying the field the latest and greatest we will never field naything, much less train with it.

Change way we do training business.

W/O restructuring our training sustems we will unlikely make digitization work in practice.

TRADOC has the bogey, but academia, ETAL. MUST HELP US GET THERE.

Bring to gether 5-7 systems at a given echelon. Train operators in each system (indiv'l training). Train staff officers/operators how each system interacts/supports/feeds/etc all other systems (horiz integration). train cdr and staff how to maximize system cababilities as they support planing, preparinf for, and executing military ops (collective activity training-battle command execution). Throw in networking, new communications structures, contingency operations, fewer resources, simulations, etc. and you have a very complex set of training issues that demand a "new" approach to digital training.

This is an issue because our time between training opportunities may be greater than the shelf life of the systems were are training for---digital systems typically lasting 2-2 1/2 years. May need to increase the frequency of training to keep the field up to date with not only the technology, but also the TTP and doctrine attendant with a ditgitized force. This is a great opportunity for distance learning, simulations, CD Rom packages and the like. Maybe we could create courses on the internet to keep officers and NCOs current--in a self-paced program that takes officers through sequential gates. Exportable training packages may also be a possible solution. If we don't pay attention to this, our initial digital warriors will be trained, but subsequent generations may be less so. This is a TRADOC responsibility--here's where we need to focus on the individual pillar of our training model. This was a real problem for mech infantry units as they transitioned from M113s to BFVs...and they didn't have to worry about the technology changing rapidly.

2. WE MUST CONTINUE WITH OUR LEADERDEVELOPMENT STRATEGY THAT AIMS AT DEVELOPING LEADERS CAPABLE OF EXECUTING THEIR MSN IN THE ABSENCE OF DIRECT GUIDANCE BECAUSE THEY UNDERSTAND THE CDR'S INTENT AND HAVE THE REQUISTE SKILL, KNOWLEDGE, AND ABILITY FOR THEIR POSITION. IF WE CONTINUE TO FOCUS ON TEACHING LDRS HOW TO THINK VS WHAT TO THINK THEY WILL TAKE CARE OF KEEPING THEMSELVES TECHNICALLY CURRENT.

Agree--problem the Army might have is the advent of information warfare and real time information, might make commanders at battalion level and below more executors than planners. Participation in the development of the plan is very much part of the art of war.

A large piece of the leader development puzzle involves sharing the commander's vision. That (allegedly) is one of the benefits of digitization. We in the army do not do a particularly good job of communicating intent. Often intent statements are highly directive and inflexible. This tendency to over-control suggests that leaders will have to be trained to guard against micro-management.

The responsibility for resolving this issue resides in TRADOC. Each of the branch proponent schools has a responsibility to develop their own strategy, which has to be approved by TRADOC, that will teach the officers at every level

how not what to think in this age of digitization. How to Do it courses should focus on the Deliberate Decision Making Process which is common to each situation and level or org.

Agree this is an issue. Our leader development program must focus on leaders doing there jobs based on the new technology and the power it provides them. Greater use of simulations and STOW should provide our future leaders the back drop of how to operate in this new information age environment vice pure podium classroom work.

Development of a relevant common picture is an important step to communicating the commander's intent. Two important characteristics of information are timeliness and relevancy. The ABCS must be capable of delivering information that the commander needs to make decisions just when it is needed. Furthermore, the information must be relevant to the commander in that it tells the commander something important about the decision situation (i.e., it is relevant to the commander). Finally, the information must be presented in a way that it is easily incorporated into the commander's mental model of the battlefield.

This is an issue because the institutional tendency with "all-seeing" info systems will be for commanders to give their subordinates less freedom of action than before. We cannot afford to allow this to happen because senior commanders simply won't be able to keep up with the OPTEMPO and will become a bottleneck in the decision process. This is a doctrine and leadership issue and probably ought to be looked at by CAL/CAC. Perhaps the BCTP teams could be instrumental in helping senior commanders focused on their level of the battle and intervening where appropriate. Interpreting commander's intent and acting appropriately is a training issue that can be addressed in both the institution and the field.

This is a key issue. Once we digitize whatever portion of the Army we must be able to provide commanders who are up to the demands of these systems. Our commanders must be better skilled in all aspects of war fighting than ever before because of the fidelity of information.

3. When does the Army start transitioning the force from AOE to Force XXI Operations?

The intellectual centers of the Army (WP, LVN, Carlisle, ROTC) need to change curriculums to encompass some training on Force XXI. This may involves not just training but leader development

Part of the problem is that we can not start training in schools w/o the doctrine/TTP to teach

The TOE Army is already experimenting with and executing many Force XXI

operations as well as using various pieces of digitization. It is hard to catch the more formal schoolhouses up to what is happening in the field.

Intellectually, I hope it has already started.

DOCTRINE DOES NOT CHANGE DUE TO TECHNOLOGY BUT TACTICS, TECHNIQUES, AND PROCEDURES DO CHANGE W/ TECHNOLOGY. WE NEED TO MAINTAIN OUR FOCUS AT THE ENTRY LEVEL SCHOOLS ON LEADER DEVELOPMENT AND DOCTRINE AND THEN SHIFT TO TTP AT THE CONTINUING EDUCATION SCHOOLS SUCH AS ADV COURSE AND LVN.

Our doctrine is absolutely changing due to technology. Technology defines the realm of the possible; doctrine represents the arrangement of activities selected from within that realm.

Doctrine is definately changing - it must. Great example is our staff - Do we really need a G-1 and a G-4 now? Do we need
all the LNOs? Consider the artillery- Do we have to have every intermediate layer of command between the sensor (observer) and shooter)?

Present discussions seem to be focused on core competencies of the leader - how many should there be and which ones are they? We need to address two issues in this area. First, we need to focus on the developmental aspect of training leaders. There are various competencies that ought to be developed early on and those that probably won't be developed (or needed) until later in the career. Second, the environment within the army ought to promote development of leaders by allowing them to grow/make mistakes while in leadership positions. We are dangerously close to a zero-defects system again.

4. In this age of constrained resources, who will write the training TTP's and MTP's that are required for units at all levels?

It has to be done by someone who is green, and takes a holistic approach to the problem. I could envision a doctrine wrting group at Leavenworth doing it for the whole Army, with inputs from the schools. Another approach might be to from a team from each of the schools and write it via e mail.

AS ALWAYA IT WILL BE THE OPERATORS WHO ARE FORCED TO ADAPT THIS HARDWARE AND TECHNOLOGY TO REAL WORLD CONTINGENCIES IN CONJUNTION W/ THE OPERATIONAL LDRSHIP OF THE ARMY WHO ARE FOCUSING ON THE DESIRED ENDSTATE 10 TO 20 YEARS DOWN THE ROAD.

This issue must be solved by focused indoctrination of our civilian force in Force XXI doctrine. Current TTP and MTP i written by contractors who have a focus of

what was done when they were in the Army up to current doctrine. Without adequate instruction from the green suiters that know Force XXi operations and the specific system that TTP must be written for we will miss the boat.

These must be derived from real-world requirements. They must be written by officers familiar with what is needed by soldiers working individually and as teams to accomplish military objectives.

This is a hard question that we are dealing with right now. Not enough folks to do the job. But this is a transition period and hopefully will sort itself out over time with good emphasis from TRADOC.

We need to get out of the habit of subcontracting out to industry our doctrine/ modeling efforts. While it has great benefites for guys after retirement, it may not serve the greater need of the Army. Tradoff time - How do we balance the TDA requirements then of Greensuiters to write doctrine vrs TOE type positions? We are being pushed by the manpower resource to our limit. Why not push some of the effort onto the TOE army who are actually the practioners?

5. This topic will be a tremendous challenge for TRADOC. The EXFOR/ECC/CAC/Mounted-Dismounted Centers will be required to pool all training and training development resources in order to train Cdrs to maximize collectively/horizontally/synergistically, the inherent capabilities of integrated systems.

Tng Development is a problem for TRADOC. They do not have the resources to develop tng packages for every level of the org. So TRADOC must consolidate the TD functions at the Hubs or Clusters for economy of resources.

This is a real example of the evolving horizontal nature of the evolution we are undergoing. In the past we could afford stovepipes and sort them our on the ground, but now we must consider how each system interacts and its inherent synergy. That is we must be trained going in not as an afterthought.

MAYBE ITS TIME WE GET AWAY FROM BRANCH SCHOOLS AND START TO EXAMINE FUNCTIONAL SCHOOLS SUCH AS LOGISTICS, INTELLIGENCE, AND OPERATIONS SCHOOLS W/ A CAPSTONE COMMAND AND CONTROL COURSE IN WHICH ALL BRANCHES RELATED TO THAT FUNCTIONAL AREA ATTEND.

Logistics, Intelligence and Information Operations with an overall C2 focus.

6. The temptation is to focus on the development of software and hardware and the training associated with deploying these. What is also needed is to consider the leadership/decision making/communicating competencies that are needed in Force XXI. For example, how do we improve the ability to communicate intent via digital

architecture?

This is a valid point, which needs to be subsummed under the training issue.

Must remember that digital training is only a subset of the larger Force XXI training challenge. A DTLOMS approach must be taken vice a materiel-based (HW/SW) approach.

Bad example. Example is how do we train our commanders to understand what information is of value to expend resources on and which is of limited/no value. This is training the warfighter and must be taken throughout the entire career of the officer in a distributed and coherent manner.

If we digitize our systems but not our leadership corps we have failed. This is new and "hard" stuff.

Clearly this is a TRADOC issue--the training community must continue to have the role of training. The issue is how the Army is going to develop the doctrine, TTP and drills that have the holistic view in mind, while continuing to create warriors who are technically literate--not necessarily capable. {Leaders need to understand machines, they don't need to operate them}

Agree. We need to remain as holistically focused as possible. One example I use is that as we developo our digital systems we need to learn not to try and always have the latest in HW/SW/even, communications. We will tend toward that dilemna, but we can't afford it nor will it provide us the opportunity to stabilize the force sufficiently long to train them how to employ it, etc. What we must do is to watch our enemies and if we are sufficiently better able to achieve info dominance then we have some time to work on the ART of command.....always looking at where technology (SCIENCE) can take us. We should then very deliberately chose our path toward the next modernization level. Cost, training, organization, etc. must all play in our decisions.

Technology will feed operational science which will then in turn feed technology. Here we have the proverbial chicken and the egg.
The hardware/ software piece are actually the easy ones. We need to continue the focus on the hard piece of figuring out
what digitization/ technology will do for us.

DIGITIZATION WILL PROVIDE OR CAN PROVIDE PRECISION CLARITY AND SUCCIENTNESS WHICH WILL ELIMINATE SOME OF THE UNCERTIANTY OR FOG OF WAR.

Agree! This issue as with all of them must not be tackled via a stovepipe. The new requirements document that is explained in TRADOC black book #3 "Requirements Determination" uses integrated concept teams (ICT) to study and

recommend solutions. Think this is the way to tackle most of these issues.

Clausewitz had it right. The fog of war will always exist. To believe that digitization will eliminate the uncertainty of the battlefield is naive. Instead, we need train commanders to operate in uncertain environments.

Inductive reasoning is the essence of decision-making with incomplete information. It is the fundamental piece. Technology should be designed to best support this intellectual process. If computer graphics fields confuse this process or needlessly complicate it, then they are inadequate. Digital hardware and software only support this fundamental process. Strong machinery can't compensate for weak minds. Would argue that we are placing too much emphasis on technology and not enough on the mind.

7. Think it's time for us to look at "just in time" training: shorter, more frequent blocks of training that address mission/unit specific tasks. Simulation can go along way toward this end. Why not distance training on the internet? Why not "UCOFT" level step training that keeps leaders current and insures that leaders meet common standards?

Not "Just in Time" training but consistent, embedded training that takes place in garrison and the field. We are not stable, nor can we afford quick fixes. It must be Train, Train, Train. Every piece will have its part and hopefully the sum is greater than the parts.

Part of the training piece is learning how units do their business. JIT Training shoudl not have to deal with SOP issues. IS it possible to make 'systems' that can/ should not be tailored to individual units? Advantages - everywhere you go, each unit operates the same. Disadvantages - not perfectly tailorable to a commander's persona.

Think iterative, progressive training might be a better adjective.

A major issue in Force XXI is linking simulations and tactical information command and control systems. The capability exists today to directly stimulate TOCS using tactical protocols at echelons battalion and above. Why have stand alone systems? Why not develop trainers that are capable of being linked into higher level simulations, while still having a stand alone capability?

Digitization of the battlefield may enable forces to train "ahead of time" on digitized terrain that they might likely be expected to operate in. "Just-in-time" training of forces just before an operation or while they are in route is a also a possible use of digitized terrain and "faster-than-real-time" computer simulations.

By JIT, I mean giving the soldier/unit the appropriate training at the most optimal time for it to be used. This is an institutional training issue primarily, but will

also apply to the other two pillars. This is important because too much of our current institutional training is focused on skills/education that may not be helpful to leader in his/her next position. Further, TTP & doctrine will change/evolve more rapidly in the future and our current institutional structure just won't be able to keep apace. This is new stuff and we are learning and adapting daily. Rather than officers/NCOs cycling every five years or so into the schoolhouse, design institutional training to update field at the correct periodicity. This could be done through a variety of means (simulation, CD ROM, internet, training export packages, etc) Here I think it is important to distinguish between the long term educational needs of the leader and the Army's short term training needs.

8. Agree with other comments that we must continue to train leaders on the art of war, just as we do today. Key training requirements for the future is training leaders on what information various systems can give them and what representations on a screen really mean. There is a real tendency to treat information on a computer screen as real time and totally accurate. Leaders need to understand what they are looking at and what filters are available to them to tailor the info they are getting. All this requires a holistic approach to training. The ATMDE's first class was an overview of the entire system for the operators, demonstraing for them how their information fit into the entire operation and the critical times in the crew drill cycle that they had to provide it.

This goes back to soldier appreciation and trust of automated systems (strengths and weaknessess. We must start before commissioning on getting our soldiers to treat information management and automation as second nature so that when confronted with automated BC they focus on the mission not the means. The principles of war will not change. The decision cycle will not change. Ho we enable the commander will.

Info Ops needs to be taught at every school in the Army. What this means to the Army as a whole is that each branch and school must do a needs analysis of what the requirements are for IO Ops at each specific level of leadership and organization.

Agree that all involved in military operations must be trained in information operations. However, as we integrate information, computer, and communication technologies throughout the force we will soon find ourselves in desperate need of experts to maintain the HW, SW, and RCP. We must eventually grow a branch of these types of people who possess the technical skills to accomplish the above.

The long term education of our officers must focus on developing logic/analytic skills and pattern recognition abilities. These are critical components of making rapid decisions under great stress. Our systems must play to the intuitive abilities of the human mind. In that regard, information must be displayed in intellectually ergonomic way. This needs be done at every level starting in precommissioning.

Personnally, think officer corps needs to understand system dynamics and have ability to apply inductive/deductive logic. Civilian universities have good programs that already teach these skills. Maybe we could tap into these courses. This is a TRADOC issue--for whomever develops the Army's institutional piece. By the way, the Army officer corps--by and large--is largely unqualified to perform this task. The ability to interpret what's on a computer screen is in large part dependent on well -developed minds, not just tactically grounded minds.

9. Topic above is really leader development. Training issue ought to focus on how digitization will improve individual, collective and institutional training for Army forces.

No. What the issue is is the relationship between leader development (fomr before assession though command echelons, etc.) and training. How do we train and develop our leaders to train and develop their staffs. That is the part we have not addressed.

Leader development is an activity that includes education and integration into the force (the Samual Huntington approach). That is far broader than simply training leaders to train their staffs. Leader development is growing leaders.

Issue is how to leverage technology in the best way to better enable the commander to make the key decisions on the battlefield.

Training (Categorizer)

Training

1. This topic will be a tremendous challenge for TRADOC. The EXFOR/ECC/CAC/Mounted-Dismounted Centers will be required to pool all training and training development resources in order to train Cdrs to maximize collectively/horizontally/synergistically, the inherent capabilities of integrated systems.

2. Because our hardware and software will have a relatively short life (2-3 years), we seem to need to develop a training system that is much more agile and responsive than our current system. Need to make a clear distinction between education and training--making training our short term responsive to changing field needs and education long term responsive to the career intellectual needs of the force.

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The intellectual centers of the Army (WP, LVN, Carlisle, ROTC) need to change curriculums to encompass some training on Force XXI. This may involves not just training but leader development

7. The temptation is to focus on the development of software and hardware and the training associated with deploying these. What is also needed is to consider the leadership/decision making/communicating competencies that are needed in Force XXI. For example, how do we improve the ability to communicate intent via digital architecture?

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Unsolved Issues

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[2 duplicate idea(s) merged]

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[4 duplicate idea(s) merged]

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[6 duplicate idea(s) merged]

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Solved Issues

Solutions to an Issue

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3. The temptation is to focus on the development of software and hardware and the

training associated with deploying these. What is also needed is to consider the leadership/decision making/communicating competencies that are needed in Force XXI. For example, how do we improve the ability to communicate intent via digital architecture?

4. Agree with other comments that we must continue to train leaders on the art of war, just as we do today. Key training requirements for the future is training leaders on what information various systems can give them and what representations on a screen really mean. There is a real tendency to treat information on a computer screen as real time and totally accurate. Leaders need to understand what they are looking at and what filters are available to them to tailor the info they are getting. All this requires a holistic approach to training. The ATMDE's first class was an overview of the entire system for the operators, demonstraing for them how their information fit into the entire operation and the critical times in the crew drill cycle that they had to provide it.

[1 duplicate idea(s) merged]

5. Think it's time for us to look at "just in time" training: shorter, more frequent blocks of training that address mission/unit specific tasks. Simulation can go along way toward this end. Why not distance training on the internet? Why not "UCOFT" level step training that keeps leaders current and insures that leaders meet common standards?

[1 duplicate idea(s) merged]

6. When does the Army start transitioning the force from AOE to Force XXI Operations?

The intellectual centers of the Army (WP, LVN, Carlisle, ROTC) need to change curriculums to encompass some training on Force XXI. This may involves not just training but leader development

Annex D Appendix 2
TOP ISSUE: Leadership (Topic Commenter)

1. The fusion of multiple and different info systems seems to be driving us to develop leaders who are multifunctional much earlier in their careers. Seems to have profound implications for our currrent dual tracking system.

bbelieve this is true. tradoc schools must adjust

Wow - Hit the nail on the head!!! Lets step out of the box for a minute and examine what we really need. We have always been empire builders!!! (FA, ADA, INTEL, etc). So who wants to lose some of their empire to a different overall organization. "Not on my watch"
One of the biggest issues is to nudge some of the leadership to consider these issues.

Need to crack the code to ensure that these multi-functional individuals are not killed for promotin opportunities because of the Army's need for their talents outside their primary branch.

Think eventually downsizing will force us into multi-functionality and elimination of branches. Leadership will not do this of their own accord. We are moving slowly in this direction, but proponents are fighting it every step of the way.

Do a functional decompostition of command and control for military operations and you will find that you need to accomplish 3 major functions: battle command, logistics, and information operations. Most of our current branches can be grouped around these 3 functional areas in a very natural and logical manner. The C2 organizations need to be reorganized around these 3 functions.

2. How wi9ll the Army train its commanders?

We train them in our doctrine. How to use the hardware/software is a separate issue that does not necessarily need to be addressed in commander training. They must take the PRODUCTS of the hardware/software and apply doctrine.

Agrre--technology is a force multiplier. Need to train commanders on what they need first--the art of war--and then how the technology can be used to give them the information they need to make intelligent decisions.

How can we traine doctrine if we dont know what our doctrine will be?

3. Will leaders at higher levels be tempted to micro-manage subordinate units since the technology will permit this?

ONE WAY TO PREVENT THIS IS THROUGH 360 DEGREE LEAERSHIP

ASSESMENTS IN WHICH LEADERS AT ALL LEVELS GET FEEDBACK AS TO WHETHER OR NOT THEY ARE MICROMANAGING OR PERCEIVED TO BE DOING SO. SOME HOW WE MUST INCORPORATE THIS KEY COMPONENT OF TQM,(LOWER LEVEL FEEDBACK), INTO OUR OFFICER EVALUATION SYSTEM.

Easy fix - software can be designed to support doctrinally what we want our commanders to do!!

Don't think anyone cares about 360 degree leadership assessment in the middle of a battle. If micro-management is the best approach based on METT-T at that time, so be it. What Div Cdr would deliberately allow something bad to happen he could fix.

4. The move to the digital specialities has not been considered in the Leadership Development Model. How do the ideas presented today affect the training, education and development of our officer corps as described by the LD Model?

WHAT ARE THE DIGITAL SPECIALTIES YOU ARE TALKING ABOUT? BE MORE SPECIFIC.

We need to shake this down form ground up. Not linked to specific technology.

5. When I showed the ATMDE to Gen Peay for the first time, I think it scared him. He immediately decided not to use it at the joint level, afraid that it would lead to a tendency to over-control subordinate operations. We have to be real concerned in the development of info ops TTP, to insure that measures are introduced to preclude this. We don't need platoon fire fights with 7 command and control helicopters stacked over it like we had during Viet nam, on occasion.

WE MUST DETERMINE WHAT THE DESIRED ENDSTATE IS FOR DIGITIZATION FOR THE STRATEGIC, OPERATIONAL, AND TACTICAL LEVELS OF WAR . WE MUST FACE THE FACT THAT WE HAVE THE CAPABILITY TO DEVELOP ALL THREE LEVELS SIMULTANEOUSLY BUT TO DO SO WILL RESULT IN PROBABLLY THE MOST ROBUST AND CAPABLE SYSTEMS BUT WILL ALSO RESULT IN DUPLICATION AND AND A MORE SEEMINGLY CHAOTIC APPROACH TO THE DESIRED ENDSTATE.

6. Commanders will have the opportunity to view the battlefield from the perespective of soldiers several echelons below. It will be a temptation for the commander to fight battles below him because the technology exists. If he does so, he will lose his the perspective necessary at his level of command.

Actually, the opposite effect occurs. Commanders have more to do and more info to process at their own echelon. They tend to leave subordinates alone even more. This is the experience from Warrior Focus, Focused Dispatch and the MSF AWEs.

Don't put the Vietnam experience onto this decade. Part of the micro-management in Vietnam, particularly toward the end was only one company-level fight going on in a division at a time. JUST CAUSE is a good example of Force XXI operations. 26 simultaneous fights. No way the division commander can micro-manage all that.

We need to be careful that commanders only are presented with the information that they need to make THEIR DECISIONS!

7. It has been pointed out that the relevant common picture must be tailored to the needs of the commander. One area that has not been addressed has been how this ought to be done. With 10 division commanders, 30 brigade commanders, and 90 battalion commanders it may be time to establish a curriculum for battle commanders that helps commanders build their RCP before they assume command. That way, the tailoring is done ahead of time rather than doing after they assume command.

Agree, but it will still take time for the staff to adopt to the new commander. It will take a shift in cognitive processing to make the transition. Some staff members will do this better than others.

Understand there is a major difference between the Relative COmmon Picture and Situational Awareness.
RCP - Common Data BAse -
Situational Awareness - Takes the RCP and coupled with the commanders experience draws upon his intuition to assess!!

8. Seems like we have to be careful not to devleop computer myopia--a generation of leaders

9. The relative common picture should probably be the same. We are trying to actually develop an awareness of the situation for that commander. He should be able to tailor his screen for what he needs to develop hic picture. Therefore, we should not focus on the RCP but more on training the commanders how to tailor the available data to meet his mental needs.

Common info but not intended to be rigidly used by subordinates. Div Cdrs RCP might be 1:100k scale.....Bde 1:50k scale. Div might display to Bn and Bde to Co, etc....but the overlays, locs (en/fr) will all be accurately overlaid whatever the backgrround and scale, etc. Same info approriately displayed...therefore, relavant and common.

WE CAN DEVELOP TEMPLATES FOR

10. I spoke to a Battalion commander while at NTC on the problem of potentially having Division Commanders fight companies. He said that it will happen and that is a good thing. I disagree. We need to train leaders how to fight at their level. This

includes task force commaders.

I have never met a Bn Cdr that said he wanted his division commander to fight his companies. This Bn Cdr must have been on Day 14 w/o sleep.

Granted a division commander can become a squad leader (always have been always will be some percentage of micro-managers) the solution resides not in system controls but in discipline through proffesional development and training. Just because we can do something does not mean we must.

Totally concur with first comment. Must keep in mind that availability of real time info may be powerful a drug for some higher commanders and they will "meddle" in areas where they really shouldn't.

I also never met a Div Cdr that wanted to command a company again.

11. The infusion of technology through out the force is creating a need for very specialized skills necessary to properly staff the force. There is a need for 3 tracks: battle command, logistics, and information operations.

These could be the three multi-functional areas that our branches evolve to.

How do we do this?

12. We should not simply link the structure of the realvive common picture to the training of leaders. This is a training issue. We are still leaders that must decide how to use the digitization to theri advantage and not to over-control their units.

TTP will clearly have to clearly articulate the role of commanders on the battlefield. Information warfare is a combat multiplier; must insure the correct shooter fires.

Leadership (Categorizer)

Leadership

1. The fusion of multiple and different info systems seems to be driving us to develop leaders who are multifunctional much earlier in their careers. Seems to have profound implications for our currrent dual tracking system.
2. How wi9ll the Army train its commanders?
3. Will leaders at higher levels be tempted to micro-manage subordinate units since the technology will permit this?
4. The infusion of technology through out the force is creating a need for very specialized skills necessary to properly staff the force. There is a need for 3 tracks: battle command, logistics, and information operations.
5. The move to the digital specialities has not been considered in the Leadership Development Model. How do the ideas presented today affect the training, education and development of our officer corps as described by the LD Model?
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Unsolved Issues

1. The fusion of multiple and different info systems seems to be driving us to develop leaders who are multifunctional much earlier in their careers. Seems to have profound implications for our currrent dual tracking system.

[5 duplicate idea(s) merged]

2. How wi9ll the Army train its commanders?

[6 duplicate idea(s) merged]

3. Will leaders at higher levels be tempted to micro-manage subordinate units since the technology will permit this?

[4 duplicate idea(s) merged]

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Solutions to an Issue

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Other

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Annex D Appendix 3
TOP ISSUE: How to Fight (Topic Commenter)

1. Would not limit just to Task Force. Digitization will fundamentally change how we fight from strategic to individual echelons.

Agreed

Fundamental change in how we fight will happen at all echelons

Hooah!!!

ageee cannot overstate the need to do a better job of training strategic warriors.

2. how does it change the way we fight, though. We have not addressed that. What advantages does digitization give us and how do we train our leaders to use these advantages

It is not clear what we will gain? Current experience is that we unfocus operators with all the detail

Digitization definitely enhances parallel planning. Units can cycle thru the planning, preparation, execute process far more rapidly. The Deliberate Decision Making Process as we know it will no longer exist.

Digitization may enable us to train our forces ahead of time on terrain that they may find themselves operating in during military operations. This is especially important when we have little or no time to respond to crisis situations. And will enable our forces to be better prepared for what happens on the ground that by simply studying the terrain from a map. Digitization will also enable the staff to start building a RCP based on information as it becomes available prior to and during the operation. It will also enable our forces to share the RCP real-time with other units preparing for the operation.

What's an RCP?

Assumption is that digitization will provide an icreased awareness of the conditions on the battlefield, thus reducing the fog of war. Therefore, there will be few to no movements to contact -- we will do hasty and deliberate attacks were the commander has the ability to see the enemy and shape his battlespace before he goes into the decisive operations phase. Enemy intentions will be more easily deduced thus reducing friendly casualties by using artillry and air to blunt or reduce the enemies forces to a point where victory is assured.

Planning
BF Awareness (location/cmbt status)

Rehearsing (digital)
Terrain visulaization
Parallel/simultaneous planning capability.
Force protection-dispersal
Combat Power-focus correct combat powere at right place at right time.
MTC- Have increased knowledge which should accomodate execution of a deliberate attk vice hasty attack once situation is developed.
Need for Hasty vice deliberate attacks decreases
Defensive operations should be able to mix mobile and area ops to achieve decisive ops
better support joint operations.

3. But has the process really changed above the Task Force level? If we do not change the staff composition - then we just streamline the pipes into the staff.

We must remained focused on the fundamentals--closing with and destroying the enemy. the basics remain the same, firing and maneuvering; closing with and destroying the enemy. What is going to change is the way decision making is made on the battlefield and the ways those decisions are passed to shooters. We gotta remember, that the end state is to get the information to the shooter. While making Corps and Division TOCS high speed is advertising this new capability, it is only preamble to getting the infomation to shooters in a timely way.

Since Brigades are where all the BOS come together, and digitization enhances integration and synchronization, there will be a lot of changes above TF level.

Does a Task Force Commander need a staff? Maybe only at the NTC.
Battalions fought on line during Desert Storm/ no fancy operations. We only seem to do complicated opns at the training centers.
Even at the NTC, I believe a TF commander can fight without a staff.

4. We may assert that digitization will change how we fight and it may but in a stepwise transition a first step (for good or ill) will overlay of digitization on traditional structures. With the magnitude of introduced variables we would be foolish to change everything at one time.

However, after committing the recourses we have, If we don't get smaller we will get a "no go" from Congress

5. Can you achieve the same results as we predict today with fewer systems in the future?

6. Digitization is not just about Battle Command. Digitization can enable every soldier/civilian at every echelon to operate more effectively and efficiently.

We need to understand that digitization will flatten organizations. For example, much of the info that I used to receive in my office through my chain of command. Now, I receive the info directly from people who are two (or even three) echelons above me. The same will happen on the battlefield.

But we cannot break the link between our love of existing structure and courage to make reak change. We will not, even when faced with overwhelming evidence, change easily.

7. We must develop tactical theory that addresses the impact of information on the battlefield. We have numerous models that address logistics, tactics, weapons, etc.., but we must figure-out how to quantify the impact of better, quicker information.

INFORMATION REDUCES UNCERTIANTY SO THE MEASURE OF MERIT FOR INFORMATION IS HOW QUICKLY YOU CAN ACT ON IT W/ PRECISION TO ACHIEVE THE DESIRED ENDSTATE.

This is already being done at TRADOC. They would probably be the first to admit that their first efforts will not be perfect. Think we need to be able to simulate how information accelerates certain feedback loops in causal cycles/systems. Causality in warfare is not linear, and information systems make it even less so. Right now our linear game models just don't capture this nonlinearity. Believe that QRMC in D.C. is doing some work in this area. Also, a PHD named Koskos writes about this stuff regularly ("Fuzzy Logic") We would be well-advised to get into this field. Maybe this would be a good job for the Systems Engineering Dept at USMA...to develop nonlinear models for the battlefield.

Don't forget, if we can simulate the Force XXI battlefield, then one benefit will be the ability to accurately replicate OPLANS so units can fight the war before they go--creating virtual combat veterans. If the training must be holistic, then the simualations must be also.

8. Who does that? The commander by definable filters or his staff by traditional stovepipe methods. WE understand we can crush the commander with infromation (we can do that now) but we are not yet samrt enough to say that we have a professional development process in place to trust commanders to be able to limit and define their CCIR, PIR into consumable packets or to be able to devine the migration process of the CCIr as the battle progresses. This is something we will have to flail our way through.

THIS CAN ONLY BE LEARNED THROUGH EXPERIANCE. THE BEAUTY NOW IS THE EXPERIANCE CAN BE GAINED THROUGH ACTUAL OR SIMULATED EXPERIANCE. THROUGH THESE METHODS WE CAN DEVELOP TEMPLATES OF WHAT THE FILTERS SHOULD BE GIVEN CERTIAN SETS OF GENERAL CIRCUMSTANCES FROM WHICH THE FOLLOWING SET OF CDRS AND STAFF OFFICERS CAN PICK AND CHOSE FROM THUS LEARNING FROM OUR INITIAL EXPERIMENTS AND EXPERIANCES.

As long as we do not try to standardize CCIR. Tried that once and pissed just

about everyone off.

9. Seems that one downside effect of digitization is that it may make decision more complex and difficult than before...Also seems to give the big commander more opportunity to micromanage and overcontrol. What can intellectual ergonomics can we apply to reduce these tendencies in our Army. This is not just a sorting issue. Complexity begets complexity.

If commanders understand what technology can give them, then they can direct their S/J6 to filter the information so they have what they need. The key remains to do the filtering at the lowest possible level, not top down.

DECISION MAKING HAS ALWAYS BEEN COMPLEX THE JOB OF THE LEADER IS TO SIMPLIFY IT BY PRIORITIZATION AND FOCUS. DIGITIZATION JUST PROVIDES US ANOTHER MEANS TO ATTEMPT TO DO THIS.

10. Seems that digitizaition will alllow units disperse and concentrate more quickly to address their combat power. Further, may be able to extract more synergy out of the systems we do have right now. More systems can be brought to bear, more quickly. Precision and interactivity seem to be the operant concepts. Will force into a more nonlinear doctrine than we have--will change the whole nature of "formations", "assembly areas" and servicing targets, for example. Force protection will also now require us to look at protecting the integrity of our info systems. If I were an info warrior, I'd be looking at how to corrupt/cut the digital links. How do you even recognize that your info systems have been corrupted before it's too late?

Good issue - We see this on a daily basis. ' The network is sick, etc' No one is sure what is really going on. Only a few select individuals can really figure out what is going on. Will they be available?

That is something we will only find out after our current generation of paper warriors has retired. It will be the current generation of LT's that will carry the real change as they apply changes that are gained out of long term exposure to digitization and its capabilities and limitations.

With every new piece of technology we create a few "geeks" tat rea ble to figure out how to make the system hum.. Without these folks, units flounder. This ought not to be. We should not build systems that are so complex that we depend on one or two smart people to figure it out.

11. As we become smaller, it will become more important to tailor our forces ahead of time for responding to crisis situations. This will simultaneously standardize SOPs and enable the forces for operate more efficently.

Standardized SOPs are important!! Training is complicated now.

The more missions we embrace as an Army the harder it will be to standardize SOPs'. This is a nice objective but in the long run we must live with what we get.

12. Digitization will provide the leaders the ability to see the battlefield with less fog of war than current capabilities. This coupled with the ability to theoretically eliminate surprise (ex. no more movements to contact) will enable all leaders to plan an adjust on the fly based on METT-T

He may see water droplets - and not the entire fog patch! Have to be careful :)

We can do that now. What we are adjusting is our level of risk. There will always be a fog of war. No two ways about it. What our product is a commander who can make a more informed (and hopefully "better") decision based on a more complete view of the battlefield.

Battle Command/ How to fight can be learned by the study of History and Communication Skills. Pattern Recognition is enhanced by studying history. Getting forces in motion towards a defineable attainable goal is enhanced by communication ablility. Just haveing a digital link does not ensure good commo. Commanders who do best are excellent communicators with an appreciation and understanding of history.

Good communicators make it easy for their subordinates to see the battlefield (mentally).

Perhaps I'm just an incorrigible skeptic. Don't believe we will ever have "perfect intelligence," at least not during my lifetime. As good as our systems they are limited by the period of their observation and the enemy moves during the interim. Further, pattern recognition is an art, a matter of interpretation. The enemy, if he has any talent at all, will do his best to make the pattern we see as ambiguous as he possibly can. That is, he will attempt to deceive us.

13. The commander will have access to more information than is possible to process from a cognitive perspective. The incoming info will have to be filtered in a way that supports the commander's intent and the unit's mission.

Ideally each commander will have been "brought up" in the process serving in increasing positions of authority over time so that by the time he is the commander he is well versed in capabilities and responsibilities at each of his subordinate echelons. The filters will be in place and can be customized by either the commander or his staff. This will need to be trained and must support the commander's CCIR.

Filter and process - keep him where he needs to be

14. How often must we change doctrine

We do not need to change doctrine. We need to understand how to leverage

technology ot allow us to evlove doctrine as we get better at understanding the significance of what technology brings us.

Wrong, we need, joint 21st Century doctrine that leverages all our emerging capabilities. Airland Operations is no longer applicable.

EVery 18 months technology leapfrogs ahead. Example - 1 year ago: Netscape and Mosaic - Now JAVA with intelligent agents. Whats next? The tactical internet is another good example. Who would of thought of it a few years back. Now we have it and are adjusting to it. Next will be the '?????????????' which may make the tactical internet obsolete. Doctrine should encompass emerging technologies!!
Make it agile ebnough - standardize software releases across the Army - we cna maybe make it.

Technological improvements on the margin don't change doctrine. Big technological improvements like the airplane, radar and digitization (taken in aggregate) will change doctrine. The combination of GBS, FAADC2I and AVENGER will significantly change ADA doctrine from reactive to proactive.

DOCTRINE DOES NOT CHANGE W/ TECHNOLOGY

How to Fight (Categorizer)

How to Fight

1. Would not limit just to Task Force. Digitization will fundamentally change how we fight from strategic to individual echelons.
2. how does it change the way we fight, though. We have not addressed that. What advantages does digitization give us and how do we train our leaders to use these advantages
3. But has the process really changed above the Task Force level? If we do not change the staff composition - then we just streamline the pipes into the staff.
4. We do not know and will not know until after we experiment.
5. We may assert that digitization will change how we fight and it may but in a stepwise transition a first step (for good or ill) will overlay of digitization on traditional structures. With the magnitude of introduced variables we would be foolish to change everything at one time.
6. The commander will have access to more information than is possible to process from a cognitive perspective. The incoming info will have to be filtered in a way that supports the commander's intent and the unit's mission.
7. Digitization is not just about Battle Command. Digitization can enable every soldier/civilian at every echelon to operate more effectively and efficiently.
8. We must develop tactical theory that addresses the impact of information on the battlefield. We have numerous models that address logistics, tactics, weapons, etc.., but we must figure-out how to quantify the impact of better, quicker information.
9. Seems that one downside effect of digitization is that it may make decision more complex and difficult than before...Also seems to give the big commander more opportunity to micromanage and overcontrol. What can intellectual ergonomics can we apply to reduce these tendencies in our Army. This is not just a sorting issue. Complexity begets complexity.
10. Digitization will provide the leaders the ability to see the battlefield with less fog of war than current capabilities. This coupled with the ability to theoretically eliminate surprise (ex. no more movements to contact) will enable all leaders to plan an adjust on the fly based on METT-T
11. Who does that? The commander by definable filters or his staff by traditional stovepipe methods. WE understand we can crush the commander with infromation (we can do that now) but we are not yet samrt enough to say that we have a professional development process in place to trust commanders to be able to limit and define their CCIR, PIR into consumable packets or to be able to devine the migration process of the CCIr as the battle progresses. This is something we will have to flail our way through.
12. Can you achieve the same results as we predict today with fewer systems in the future?
13. I submit that we will have more systems in the future only converging at a single point.
14. Seems that digitizaition will alllow units disperse and concentrate more quickly

to address their combat power. Further, may be able to extract more synergy out of the systems we do have right now. More systems can be brought to bear, more quickly. Precision and interactivity seem to be the operant concepts. Will force into a more nonlinear doctrine than we have--will change the whole nature of "formations", "assembly areas" and servicing targets, for example. Force protection will also now require us to look at protecting the integrity of our info systems. If I were an info warrior, I'd be looking at how to corrupt/cut the digital links. How do you even recognize that your info systems have been corrupted before it's too late?

15. As we become smaller, it will become more important to tailor our forces ahead of time for responding to crisis situations. This will simultaneously standardize SOPs and enable the forces for operate more efficently.

16. 2222

17. How often must we change doctrine

Unsolved Issues

1. Would not limit just to Task Force. Digitization will fundamentally change how we fight from strategic to individual echelons.

[3 duplicate idea(s) merged]

2. how does it change the way we fight, though. We have not addressed that. What advantages does digitization give us and how do we train our leaders to use these advantages

[2 duplicate idea(s) merged]

3. But has the process really changed above the Task Force level? If we do not change the staff composition - then we just streamline the pipes into the staff.

[2 duplicate idea(s) merged]

4. We may assert that digitization will change how we fight and it may but in a stepwise transition a first step (for good or ill) will overlay of digitization on traditional structures. With the magnitude of introduced variables we would be foolish to change everything at one time.

[1 duplicate idea(s) merged]

5. Can you achieve the same results as we predict today with fewer systems in the future?

[4 duplicate idea(s) merged]

6. Digitization is not just about Battle Command. Digitization can enable every soldier/civilian at every echelon to operate more effectively and efficiently.

7. We must develop tactical theory that addresses the impact of information on the battlefield. We have numerous models that address logistics, tactics, weapons, etc.., but we must figure-out how to quantify the impact of better, quicker information.

[2 duplicate idea(s) merged]

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10. Seems that digitizaition will alllow units disperse and concentrate more quickly to address their combat power. Further, may be able to extract more synergy out of the systems we do have right now. More systems can be brought to bear, more quickly. Precision and interactivity seem to be the operant concepts. Will force into a more nonlinear doctrine than we have--will change the whole nature of "formations", "assembly areas" and servicing targets, for example. Force protection will also now require us to look at protecting the integrity of our info systems. If I were an info warrior, I'd be looking at how to corrupt/cut the digital links. How do you even recognize that your info systems have been corrupted before it's too late?

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13. The commander will have access to more information than is possible to process from a cognitive perspective. The incoming info will have to be filtered in a way that supports the commander's intent and the unit's mission.

14. How often must we change doctrine

Solved Issues

1. Would not limit just to Task Force. Digitization will fundamentally change how we fight from strategic to individual echelons.

2. I submit that we will have more systems in the future only converging at a single

point.

[1 duplicate idea(s) merged]

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Solutions to an Issue

1. We do not know and will not know until after we experiment.
2. But has the process really changed above the Task Force level? If we do not change the staff composition - then we just streamline the pipes into the staff.
3. The commander will have access to more information than is possible to process from a cognitive perspective. The incoming info will have to be filtered in a way that supports the commander's intent and the unit's mission.

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10. We must develop tactical theory that addresses the impact of information on the battlefield. We have numerous models that address logistics, tactics, weapons, etc.., but we must figure-out how to quantify the impact of better, quicker information.

Other

1. Would not limit just to Task Force. Digitization will fundamentally change how we fight from strategic to individual echelons.

[2 duplicate idea(s) merged]

2. how does it change the way we fight, though. We have not addressed that. What advantages does digitization give us and how do we train our leaders to use these advantages

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[2 duplicate idea(s) merged]

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11. We may assert that digitization will change how we fight and it may but in a stepwise transition a first step (for good or ill) will overlay of digitization on traditional structures. With the magnitude of introduced variables we would be foolish to change everything at one time.

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Annex D Appendix 4
TOP ISSUE: Transition (Categorizer)

Transition

1. The Operational Architecture Development does not address the impact of technology and its effects on doctrine.
2. Unity of command Army wide must be understood and embraced by all participants especially in the context of a reduced resource environment. without this we squander time, money and soldiers with the prospect of a questionable product.
3. given adeclining resource environ, how does the army fund transition of 150 legacy systems to a common tech arch?
4. The number of users on the Internet doubles every 6 months, while technology is at least 18 months behind. Thus, we can expect the number of users on any tactical system to outpace the growth of technology. We should design any system anticapting user growth.
5. We must remember that we are already in transition. Each division in the Army has fielded digital capabilities right now. As we shape the path we must account for AFATDS, MCS, ULLS, M1A2; digital commo such as EPLRS, MSE Packet, and SINCGARS; specific technologies such as Phototelisis, Telemedicine, VTC. This is not coming from a standing start. Its like jumping on a moving train and running forward to take over the engine room.
6. how do we transition. Do we shut down entire divisions and then field and train them on digitization? Do we field portions of the digitization packet and then keep that unit "semi-opertional"?
7. We have to be willing to C5 units to get them trained and transitioned as we digitize what we can of the remaining force structure (active and reserve). We cannot allow the WF mentality to hamstring our efforts. The readiness requirement, no matter how noble, only makes a hard job harder.
8. We need an effective analysis plan prior to any 'experiments'. I use that term loosley because an experiment presumes that we are attempting to control some of the variables. Our AWE's have really not done that well. We have many agendas being followed. What are we really learning?
9. Do not presuppose to think that "experiment" in a TRADOC lexicon means the same to a warfighter compared to an engineer compared to an operational tester. Everyone is getting wrapped around the axle with experimental caontrol. Fundamentally that cannot happen be defintion. The TFXX & Div XXI AWE's are not focused to that. We are not looking at each hill but at a mountain range.
10. How is the Army going to respond to fielding essentially 2-3 technologically different versions of the Army? This was a significant problem for the Army of Excellence...produced some thorny personnel management issues as well as training and leader develpment problems.
11. The business of the Army is readiness to provide effective forces to the warfighting CINCs. Our transition (with only 10 divisions/roughly 4 of which are

committed everyday) must ensure we do not break readiness.
12. We need to field specific units or specitfic levels. We cannot start some systems from the top and some from the bottom. If we run out of money we do not have anything worhtwhile.

Unsolved Issues

1. The Operational Architecture Development does not address the impact of technology and its effects on doctrine.

[2 duplicate idea(s) merged]

2. We must remember that we are already in transition. Each division in the Army has fielded digital capabilities right now. As we shape the path we must account for AFATDS, MCS, ULLS, M1A2; digital commo such as EPLRS, MSE Packet, and SINCGARS; specific technologies such as Phototelisis, Telemedicine, VTC. This is not coming from a standing start. Its like jumping on a moving train and running forward to take over the engine room.

[3 duplicate idea(s) merged]

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[5 duplicate idea(s) merged]

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[1 duplicate idea(s) merged]

6. Unity of command Army wide must be understood and embraced by all participants especially in the context of a reduced resource environment. without this we squander time, money and soldiers with the prospect of a questionable product.

[1 duplicate idea(s) merged]

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[3 duplicate idea(s) merged]

11. We need an effective analysis plan prior to any 'experiments'. I use that term loosley because an experiment presumes that we are attempting to control some of the variables. Our AWE's have really not done that well. We have many agendas being followed. What are we really learning?

Solved Issues

1. Unity of command Army wide must be understood and embraced by all participants especially in the context of a reduced resource environment. without this we squander time, money and soldiers with the prospect of a questionable product.

Solutions to an Issue

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[1 duplicate idea(s) merged]

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5. Do not presuppose to think that "experiment" in a TRADOC lexicon means the same to a warfighter compared to an engineer compared to an operational tester. Everyone is getting wrapped around the axle with experimental caontrol. Fundamentally that cannot happen be defintion. The TFXX & Div XXI AWE's are not focused to that. We are not looking at each hill but at a mountain range.

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Other

1. Unity of command Army wide must be understood and embraced by all participants especially in the context of a reduced resource environment. without this we squander time, money and soldiers with the prospect of a questionable product.

[2 duplicate idea(s) merged]

2. We must remember that we are already in transition. Each division in the Army has fielded digital capabilities right now. As we shape the path we must account for AFATDS, MCS, ULLS, M1A2; digital commo such as EPLRS, MSE Packet, and SINCGARS; specific technologies such as Phototelisis, Telemedicine, VTC. This is not coming from a standing start. Its like jumping on a moving train and running forward to take over the engine room.

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Non-Sequitor

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unsolved; low pri

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legacy systems to a common tech arch?

Annex D Appendix 5
TOP ISSUE: Organization (Categorizer)

Organization

1. We can only know that if we have a logical plan for organizational change that is tied to best guesses of what "enablers" can do for us operationally and be will to step backward or forward based on what we learn as we experiment. We cannot assume that we know more than we do.
2. Command Posts will have to become integrating centers. DIVARTY, MI TOCs, Engineer Bde HQ will be replaced by Bde Combat Team CPs that are multi-functional and can plan, coordinate and execute multi-disciplined operations.
3. we need to fully address the specific things that digitization will do for leaders and soldiers at all levels. Once we do that we can address what chnges we need to make to optimize the effects of digitization. We are doing it the other way around!
4. My experience with the Force Projection TOC has convinced me that the Army drastically needs to rethink its organizational structures--and TRADOC has already appreciated the fact. Today, the Army is structured with a 60-40% allocation of staff resources between operations and plans. In the future, current operations, because it is the major recipient of real time information, must have the lion's share of the operations staff function. Planners will do some traditional planning functions in the future, but most of their efforts will be focused on setting the digital conditions for the next day's battle--insuring the sensor coverage is the right place, etc. The ATMDE worked well with a large current operations cell, a smaller near real time group [less than 1/3 the size of the real time group, which worked 24-48 hours out], and a very small long term ops group of 2-3 people which worked issues 48-96 hours out.
5. Most major corporations have a CEO (Chief Executative Officer), CFO (Chief Finance Offficer), and a CIO (Chief Information Officer). Maybe the Army needs to create tactical positions dealing strictly with the management of information on the battklefield. This would address some training issues.
6. WE NEED TO ADRESS THE MANNING ISSUE FOR CP'S BECAUSE THESE NEW COMMAND AND CONTROL SYSTEMS REQUIRE DEDICATED OPERATORS WHILE WE STILL MUST MAINTAIN THEY ENTIRE CMD POST'S OPERATIONS. THIS WILL ESPECIALLY BE CRITICAL DURING THE TRANSITION FROM THE CURRENT STATE TO THE FUTURE STATE.
7. Digitization has already affected signal/automation structure. Key to this is the advent of the TacInternet. This system of LAN/WAN/Router/Switches/etc will require new approaches to maintenance and support. We have seen a reduction in tactical signal systems support; however, a marked increase in 31B's, 74B's, and G/S6's. Expect that with we have only begun to understand unique support requirements of digital force. On one hand we gain efficiencies on the other we have new support requirements.
8. If we create some positions - then we have to rethink the entire officer development piece. Right now we are an Army of haves and have - nots. Some will

command and some will not. Our current mentality says that if you are not a have, then you are a second class citizen. If we incorporate the functionality of a CIO, then the measures of success for that type of officer will be drastically different from those of a battle commander. The signal branch is probably not the answer either. Multi-functional training must be addressed early on in an officer's career. Decide up front (if possible) which branch holds the chances for more success. Give that type of officer incentive to follow that career path.

9. Operators of digital systems will likely be the staff officers who need the info and perform the required tasks. The days of PVT operators, etc are gone. Primary staff members will probably not have to operate their system...but they'd best know how to do it if their deputy is in the latrine. Computer literacy is mandatory...even fundamental.

Unsolved Issues

1. We can only know that if we have a logical plan for organizational change that is tied to best guesses of what "enablers" can do for us operationally and be will to step backward or forward based on what we learn as we experiment. We cannot assume that we know more than we do.

[2 duplicate idea(s) merged]

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[3 duplicate idea(s) merged]

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[1 duplicate idea(s) merged]

Solved Issues

1. WE NEED TO ADRESS THE MANNING ISSUE FOR CP'S BECAUSE THESE NEW COMMAND AND CONTROL SYSTEMS REQUIRE DEDICATED OPERATORS WHILE WE STILL MUST MAINTAIN THEY ENTIRE CMD POST'S OPERATIONS. THIS WILL ESPECIALLY BE CRITICAL DURING THE TRANSITION FROM THE CURRENT STATE TO THE FUTURE STATE.

Solutions to an Issue

1. we need to fully address the specific things that digitization will do for leaders and soldiers at all levels. Once we do that we can address what chnges we need to make to optimize the effects of digitization. We are doing it the other way around!

[3 duplicate idea(s) merged]

2. Command Posts will have to become integrating centers. DIVARTY, MI TOCs,

Engineer Bde HQ will be replaced by Bde Combat Team CPs that are multi-functional and can plan, coordinate and execute multi-disciplined operations.

[6 duplicate idea(s) merged]

3. We can only know that if we have a logical plan for organizational change that is tied to best guesses of what "enablers" can do for us operationally and be will to step backward or forward based on what we learn as we experiment. We cannot assume that we know more than we do.

[1 duplicate idea(s) merged]

4. Most major corporations have a CEO (Chief Executative Officer), CFO (Chief Finance Offficer), and a CIO (Chief Information Officer). Maybe the Army needs to create tactical positions dealing strictly with the management of information on the battklefield. This would address some training issues.

[4 duplicate idea(s) merged]

5. My experience with the Force Projection TOC has convinced me that the Army drastically needs to rethink its organizational structures--and TRADOC has already appreciated the fact. Today, the Army is structured with a 60-40% allocation of staff resources between operations and plans. In the future, current operations, because it is the major recipient of real time information, must have the lion's share of the operations staff function. Planners will do some traditional planning functions in the future, but most of their efforts will be focused on setting the digital conditions for the next day's battle--insuring the sensor coverage is the right place, etc. The ATMDE worked well with a large current operations cell, a smaller near real time group [less than 1/3 the size of the real time group, which worked 24-48 hours out], and a very small long term ops group of 2-3 people which worked issues 48-96 hours out.

[1 duplicate idea(s) merged]

6. Digitization has already affected signal/automation structure. Key to this is the advent of the TacInternet. This system of LAN/WAN/Router/Switches/etc will require new approaches to maintenance and support. We have seen a reduction in tactical signal systems support; however, a marked increase in 31B's, 74B's, and G/S6's. Expect that with we have only begun to understand unique support requirements of digital force. On one hand we gain efficiencies on the other we have new support requirements.

Other

1. Command Posts will have to become integrating centers. DIVARTY, MI TOCs, Engineer Bde HQ will be replaced by Bde Combat Team CPs that are multi-functional and can plan, coordinate and execute multi-disciplined operations.

2. My experience with the Force Projection TOC has convinced me that the Army drastically needs to rethink its organizational structures--and TRADOC has already appreciated the fact. Today, the Army is structured with a 60-40% allocation of

staff resources between operations and plans. In the future, current operations, because it is the major recipient of real time information, must have the lion's share of the operations staff function. Planners will do some traditional planning functions in the future, but most of their efforts will be focused on setting the digital conditions for the next day's battle--insuring the sensor coverage is the right place, etc. The ATMDE worked well with a large current operations cell, a smaller near real time group [less than 1/3 the size of the real time group, which worked 24-48 hours out], and a very small long term ops group of 2-3 people which worked issues 48-96 hours out.

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[1 duplicate idea(s) merged]

5. If we create some positions - then we have to rethink the entire officer development piece. Right now we are an Army of haves and have - nots. Some will command and some will not. Our current mentality says that if you are not a have, then you are a second class citizen. If we incorporate the functionality of a CIO, then the measures of success for that type of officer will be drastically different from those of a battle commander. The signal branch is probably not the answer either. Multi-functional training must be addressed early on in an officer's career. Decide up front (if possible) which branch holds the chances for more success. Give that type of officer incentive to follow that career path.

6. Operators of digital systems will likely be the staff officers who need the info and perform the required tasks. The days of PVT operators, etc are gone. Primary staff members will probably not have to operate their system...but they'd best know how to do it if their deputy is in the latrine. Computer literacy is mandatory...even fundamental.

[1 duplicate idea(s) merged]

Annex D Appendix 6
TOP ISSUE: Interoperability (Categorizer)

Interoperability

1. Liason officeers or teams are not the answer. Currently, 525-5 states that the digitized unit will, provide hardware and personnel to the non-digitized unit. This will not work. This requires too many personnel and too much hardware to be effective.
2. Liaison Teams are the the immediate answer. Three 10 men liaison teams per division with ABCS capability. They can be used between digitized/non-digitized Army echelons, as well as, allied and coalition forces.
3. Liason teams work well - but where is the true integration?
4. a nondigiltized unit has some but not all digitized eqluipment . linkingeqquipment must be proived by the diglitized unit. lin
5. why not attempt to develop some interface between the voice information in a non-digitized unit and the ABCS in a digitized unit. How do we reduce the size of a division or unit when we have to field so many liason teams?
6. This is also a fielding issue. If we field a brigade, then we have a nondigitized/digitized interface problem. If we transition a division incrementally, then we have a partially digitizd unit. Why not digitize a whole division at a time and then we reduce the requirement for liason teams
7. Industry is addressing some of these same issues by creating information officers and information organizations. Maybe it is time to re-think the tradational roles of the S1 through S-4 and corresponding upperl level staff organizations.
8. First, we must develop operational concepts (FM 100-5) that can be executed by both digital and non-digital elements.
Second, we must develop the TTP that will enable non-digitized units to generate and use a common relevant picture w/o the technology. This can be done thru SOPs, common graphics, common terms/language, crosstalk, etc.
Third, Non-digital units must advantage the technology they do have: MSE w/ Field Fax, TACFIR/AFATDS, etc
9. Digitization is a frame of mind, not a technological solution.
10. When you have a slew to cue capability, how to control fires with non-digitized unti? They will still fire "amnually".
11. Interoperability is not technology.
12. What about a set of appliques that can be attached externally to non-gdigitized units. Seems that even non-digitized units will have to school and train their leaders in the common fighting processes that all the units in the coalition will use. This is as much about common training and education as it is about technology. This suggests that digitized units develop a whole set of protocols that facilitate their operating with those that can't operate as agilely.
13. Answer to this question is probably different at different echelons.
14. Training is key. The integration of technology across the force REQUIRES us to simultaneously integrate the same technologies into the training systems. The

vehicle for doing this may be the CATT family with the CCTT being the first of these to be developed.

15. Interoperability can be 'fixed' with technology

Unsolved Issues

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2. why not attempt to develop some interface between the voice information in a non-digitized unit and the ABCS in a digitized unit. How do we reduce the size of a division or unit when we have to field so many liason teams?

[1 duplicate idea(s) merged]

3. Liason teams work well - but where is the true integration?

[3 duplicate idea(s) merged]

4. Liason officeers or teams are not the answer. Currently, 525-5 states that the digitized unit will, provide hardware and personnel to the non-digitized unit. This will not work. This requires too many personnel and too much hardware to be effective.

[2 duplicate idea(s) merged]

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[1 duplicate idea(s) merged]

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[1 duplicate idea(s) merged]

7. Answer to this question is probably different at different echelons.

8. When you have a slew to cue capability, how to control fires with non-digitized unti? They will still fire "amnually".

Solved Issues

1. Liaison Teams are the the immediate answer. Three 10 men liaison teams per division with ABCS capability. They can be used between digitized/non-digitized Army echelons, as well as, allied and coalition forces.

Solutions to an Issue

1. Industry is addressing some of these same issues by creating information officers and information organizations. Maybe it is time to re-think the tradational roles of the S1 through S-4 and corresponding upperl level staff organizations.

2. Liaison Teams are the the immediate answer. Three 10 men liaison teams per division with ABCS capability. They can be used between digitized/non-digitized Army echelons, as well as, allied and coalition forces.

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7. What about a set of appliques that can be attached externally to non-gdigitized units. Seems that even non-digitized units will have to school and train their leaders in the common fighting processes that all the units in the coalition will use. This is as much about common training and education as it is about technology. This suggests that digitized units develop a whole set of protocols that facilitate their operating with those that can't operate as agilely.
8. Digitization is a frame of mind, not a technological solution.

Other

1. Interoperability is not technology.
[1 duplicate idea(s) merged]

2. Digitization is a frame of mind, not a technological solution.
[1 duplicate idea(s) merged]

3. When you have a slew to cue capability, how to control fires with non-digitized unti? They will still fire "amnually".
4. Liason teams work well - but where is the true integration?
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6. Interoperability can be 'fixed' with technology

Irrelavent

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5. Answer to this question is probably different at different echelons.

Annex D Appendix 7
TOP ISSUE: Readiness (Categorizer)

Readiness

1. Training - Training- Training. How can a unit be ready if no one understands the capability of systems? Especially if fielding plans only focus on one unit at a time. Now we have soldiers rotating between digitized and non-digitized units.
2. - Possible change in C-status based on digital systems being NMC
- If digitization increases force effectiveness, does the loss of digitization significantly inhibit the unit's ability to accomplish its mission. Redundancy and fall back systems must be inplace to ensure that digitization is not a force stopper.
3. When does the requirement for redundant systems become a problem? Doesn't the "need" for redundant systmes destroy some of the gain from digitization.? If the system of digitization is so unreliable, why have it?
4. Must look at this from both an individual and collective perspective. Decrease in OPTEMPO dollars and the increase in missions that take units away from their conventional war METL tasks make it imperative that leaders come better prepared when they arrive in a unit, particularly in a force projection Army where leaders may be deployed shortly after they arrive in a unit. Simulations in the field need to be interactive with units in the field. Maybe there ought to be a melding of schoolhouse and unit training. Simulations will have toserve to offset the increasingly less METL training units are currently getting.
5. Certainly will have an unique impact as much of the PLL and ASL we traditionally stock will be for commercial systems. Think an important part of our hardware strategy must be to create the ability to run as many applications on the same platform. Why can't we develop the technology to run FAAD, MCS, AFATDS, ASAS, etc--all on the same platform? If our HW architecture did this, would have redundancy and would reduce down times. We need common platforms and the ability to stack applications on the same platform.

Solved Issues

1. - Possible change in C-status based on digital systems being NMC
- If digitization increases force effectiveness, does the loss of digitization significantly inhibit the unit's ability to accomplish its mission. Redundancy and fall back systems must be inplace to ensure that digitization is not a force stopper.
[2 duplicate idea(s) merged]

2. When does the requirement for redundant systems become a problem? Doesn't the "need" for redundant systmes destroy some of the gain from digitization.? If the system of digitization is so unreliable, why have it?
3. Must look at this from both an individual and collective perspective. Decrease in OPTEMPO dollars and the increase in missions that take units away from their conventional war METL tasks make it imperative that leaders come better prepared when they arrive in a unit, particularly in a force projection Army where leaders may be deployed shortly after they arrive in a unit. Simulations in the field need to

be interactive with units in the field. Maybe there ought to be a melding of schoolhouse and unit training. Simulations will have toserve to offset the increasingly less METL training units are currently getting.

Unsolved Issues

1. Training - Training- Training. How can a unit be ready if no one understands the capability of systems? Especially if fielding plans only focus on one unit at a time. Now we have soldiers rotating between digitized and non-digitized units.

2. - Possible change in C-status based on digital systems being NMC

- If digitization increases force effectiveness, does the loss of digitization significantly inhibit the unit's ability to accomplish its mission. Redundancy and fall back systems must be inplace to ensure that digitization is not a force stopper.

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Solutions to an Issue

Other

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Annex E
Transcripts of Verbal Comments During Symposium

LTC Greer: You have got to remember that interoperability is not about technology. Technology is one of the enablers that, of interoperability. Common language, common graphics, common thought processes, uh, a common approach to warfighting. That is what interoperability is all about. For years and years people have had interoperability and haven't had digital thing one. Does digitization let you operate, uh, more effectively, efficiently and faster, yes, but if you haven't worked through how you are going to fight together, um, if you don't have common operational concepts if you don't have common TTPs and SOPs, then it doesn't make any difference. Then you have to make sure that digitization doesn't force you actually away from interoperability. But it has got to be something that is always bringing you closer to interoperability.

LTC McGinnis: Jim, the point is if you have an asymmetric force where you have got units that *are* digitized, assuming that the doctrine and the SOPs are consistent throughout, it then becomes a show stopper, in a way, if you have one force that is able to see the Relative Common Picture, understand perhaps how to speed up operations and how to be in the right place at the right time when your synchronization is so much tighter because you are compressing those cycles that if you don't have the digitization and you don't have the ability to communicate and process with computers and you are doing it all by hand and doing it over the radio, as opposed to the other group who is doing it digitally and its automated and you have the alarms and the triggers that are popping up and telling people when to do things if you don't have that then you are doing just what you said. If you don't have the digital capability, the technologies, you are driving them apart, quicker.

LTC Shattuck: Does a digitized force actually act faster, respond faster than a non-digitized force. My understanding is that from one of the focused rotations out at NTC that the digitized force was in fact a little slower than the non-digitized force.

MG Rigby: Don't consider 94-07 a digitized force. That was a very rudimentary approach that really identified where do we go from here. We didn't have a digitized force out there really. We had some units that had digital equipment with very little or no training at all, uh, we had a lot of e-mail operators. It was not a digitized force. You can't really draw any conclusions from the performance there.

COL Hoffman: That really leads naturally, I think, to a whole training issue. I don't want to digress. But, I think Jim's point about the common training requires that the guys in the non-digitized units number one understand the systems they are going to be operating so that the assembly time goes down. They have to know how to use them. They have to know what capabilities that they bring. They have to be able to talk the same language. It aslo bespeaks of a need to send everybody to same levels of training. I'll just give you an example from my pre-historic experience with Bradleys. We went

for a long time where we did not train our senior officers right before we sent them to Bradley units and we had some real difficulties with them understanding the system and how to fight the system when they first came to the units and there was a real time-lag, six months to eight months, before they became fully operant with all the tactics, techniques and procedures that were peculiar to AOE kinds of units. I would suggest to you that you will find the same kind of phenomenon with digitized units. So if you don't have a system for just in time training, if you will, for people who are going to these kinds of units, that are going to have to operate in these units, you're going to have the same kinds of problems we had and you will find that people can't optimize the capabilities digitization brings to the battlefield.

MG Rigby: the way we currently field equipment, given the way the Army fields equipment, its always going to cause us to have a high-low mix of units. If you field force package 1 first, force package 2, force package 3 driven by resource availability, you're always going to have this problem. There is just no way around it. Unless the leadership makes a fundamental decision that digital command and control is so important that we make the trade-offs with other modernized equipment and field the entire Army in a relatively short time frame. Now that's a fundamental change from the way we do business. Maybe that's the answer. If you have some comments on that I'd sure like to hear them.

MAJ McFadden: That brings up a point. One of the issues that we had discussed before, is that just as you say that the Army does its fielding in the manner digitization is supposed to give the commander the ability to see things better and plan and execute operations faster at his own control tempo and give him greater force effectiveness then a possible strategy would be to change the way we field, and field the corps and field the divisions first so that you get the interoperability among the Army's top organizations at the tactical level and then start filtering down to the systems down to the brigade and battalion.

COL Semmens: See the thing you forget is, what is Information Warfare all about? Sensor to shooter - getting steel on target. I'll tell ya that the key thing is that is the critical loop in all of this. You know when you talk information warfare one of the things when I fielded the Force Projection TOC was Filters. We are going to have to create a new kind of Army officer that's half communicator/half computer guy to be able to integrate all of this stuff together and gonna have the ability to put the appropriate filters in so that the commander can have ability to select as Steve was talking about in his presentation today. But you know its an architecture that is very difficult because you want the information at the bottom if you can possibly do it. The same information at the bottom almost, although relevant is the word Gen Rigby used which I thought was a good one, but you want that information available at the bottom unit, filtered, so that shooter can get the information when he needs it. The other important point is, and you have to remember this guys, not everyone on the battlefield needs to be an information processor. By that I mean actually assimilate information, collate information, process information. Because we got the ability today to take a fusion device, whatever you want to say in the

TOC, the old map we used to have in the center of the TOC as I think Steve mentioned, and pump that information anywhere on the battle field very, very quickly. That is doable today easy, easy, on the move. Ya know, the technology is here today and so at least an interim approach might be if your end state is processors that aren't quite as capable as Sun Sparc 20's and are just information receipt things to think through an architecture in the near term where those lessor processors are just receiving the information from the larger fusion centers, which we call TOCs today, but their getting that whatever relevant data is and the information officers, whatever we're gonna call these guys, and filter that stuff. Everybody doesn't need, you know the FP TOC when we fielded the thing, everybody said every general that came through it, including the two in this room said that "I want one". You don't necessarily need to have that. You need to take the parts of the information, the TOC is not important, the information is what's important. You got to keep that in mind. The information is what is important and you got to take that stuff and pump it out to the guys who need it.

COL Baribeau: Well, everyone will be pleased to know that I have submitted to DA a request to field the Army Battle Command system in a fundamentally different way. And what it is, is it says that within a reasonable period of time we would like to have all the systems arrive in a command so that that commander has at his beckon call the resource to make it work in a holistic manner. And it has really driven the guys in DAMO nuts because what they look at is DAMPL, you know they come back to me and say "well MCS is being fielded in three years, what more do you want?" I said, well, I am not really concerned on how fast the *systems* are fielded, you then by default the unit commander wakes up that morning and says "jeez, I've got all the systems, I can start doing ABCS." What I would rather him do is be told that within six months window we are going to adjust the DAMPLs so that he is going to have a major training activity that is going to impact on his readiness significantly but he is going to get all the stuff he hasn't gotten to date and he is going to then be able to start to train with ABCS. Now the missing links are, and this is interesting, FBCB2 and digital radios. FBCB2 won't be ready for a couple of years. I mean, that is what Appliqué is all about is to try and figure out what this lower piece of the Army Battle Command System is all about. We know it is something to do with positional awareness. We know it is something about...has to do with situational awareness in other words combat readiness of the platform of the soldier or the weapon system and we know it has to do with digital radios an Internet of some sort and a carrier, a communications system, if you will. So I think it is four things, but were not quite sure exactly how it's all going to work yet. But the fact, is I don't think that we stop fielding the rest of the ABCS systems waiting for FBCB2 or the digital radios to arrive. I think we got to push forward and then what we've got to do as soon as we've got them again is go back through a similar prioritization and get the rest of the pieces in place in those organization that need them first, in other words the battalions, the brigades and the companies.

MG Rigby: This fielding issue is one that the Army hasn't put its finger on yet but it is probably the most fundamental issue in the whole thing. It really is not just the ABCS systems, although I think that is probably the most important. But you have got to go

back in and look at all the combat platforms: the M1A2 Sep, the Bradley A3, the Longbow Apache. You got to figure out what is the optimum time to field those platforms along with the command and control system. If you look at the Army modernization fielding right now, it is disconnected. And somehow it has to be brought together in a way that does what the Major [McFadden] said there that tries to optimize command and control, that puts the sensor to shooter best fix on the battlefield within the resources. We've got to go back and re-look this whole fielding issue, I think.

MAJ Agoglia: I would just say that we have got to look at what level of war we are fighting at to see where the greatest threat is. Tactical level, give me a tank and with what I have I can do a pretty good job, sir, of getting information to the people I need to, killing people, doing what I need to do. What I want to know that I have is that I am protected against theater ballistic missiles, I am protected against chemical and biological agents and let's start fielding this equipment at the operational level, at the higher headquarters level, that will provide them with the information necessary to set the architecture of the battlefield so that if I go in there and I have a few, lose a few battles we can still overcome that because we have the information at the right level. Now I hear you talking about fielding at division level battalion level and brigade level I spent a year in Korea at the theater headquarters and we did not have what we needed to...

COL Baribeau: OK, what you guys are talking about is kinda happening. I would tell you that some systems are better fielded at the Corps first and then go down. Artillery is a perfect example. If you don't have Artillery at the Corps the end to end shooter doesn't work. So you have got to field artillery top down. Some systems it is probably better to start bottom up. I'd say maneuver control would be an example of where it would be probably better to give the battalion commander that power and build up. But the fact is, we've also just received a tasker to build a TOC for Third Army. We're trying to put together a BECE, first BECE in a digital manner, the only irony there is who do they talk to? Ya know once you get them digitized, who do they talk to? WE have to address that so we might have to field XVIIIth Corps. Third Army would be their other interface. So it's kinda happening that way. People are realizing that it's not that we are taking the Theater Missile defense TOC. But what we are trying to do is do a little more objective. It was a course holder during a period of time when they needed the ability all kinds of Link 16 and JSTARS and that sort of stuff and put it into a place where a commander could go to see all that information inside the same facility. And were gonna build off of that. We will use the PMs experience in those areas. But the fact is that the people in Korea are starting to want something like that, Third Army wants something like that, I expect XVIIIth Corps pretty quickly is going to be beating on our door so things are happening in that area.

MG Rigby: I really think we have to control that appetite until we know what we are doing because I can tell you that resources are very, very scarce right now. The Army may take another big whack here in the not to distant future.

COL Baribeau: They won't get objective systems. They will get beta version of MCS. But they will get the ability to do the connectivity but they won't have full interoperability by any means. General Miller's guidance was to give them things that can be grown into future systems at current affordable prices and with standard systems. But Korea is starting to beat on our door…

COL Semmens: I guess what I am afraid of is what Gen Rigby said this stuff is expensive. I mean it is big time expensive. And I don't want the Army to say to hell with it, this stuff is too expensive and take my friend John's [Agoglia] approach and ya know we have got great tanks we'll put in a few Corps and Division TOCs and call it a day. I guess what I am recommending to you Steve is a fall back plan. You know how can you have a few information centers and distribute the information across the battlefield. That is very, very important. And I don't think we are going to get to…

MAJ Agoglia: I think we will fight differently but I think the doctrine will follow. There will be some differences in how we fight and there will be some differences in how quickly we share and spread and share information around and how quickly we react to it. But again the basis of what we are doing at the squad, platoon and company level I don't think is going to change a lot. I think it would stay the same, sir.

BG Ohle: It is my opinion that it will change. We don't know how much. That is what this experimentation is all about. I am concerned that too may people assume that it won't change. I think that it is going to fundamentally change and we have got to be prepared to change the structures and the procurement of other systems based on how well digitization works. I really think that is true. Right now we are staying with a tank battalion, for an example. that's 58 tanks. Why can't digitization do things more efficiently and go to a, whatever, 44-42 tank battalion. I think we'll be able to once we work through this. Just the sensor-to-shooter concept we don't know what it will really produce on the battlefield. So I think that we have got a first-order level requirement and that's to fight and win at the small unit level. You have got to mature that as we bring on these information systems. We cannot not be able to execute that. We have got to be able to fight and win any time and any place. Then as we bring on digitization-type equipment then we experiment and we change based on our results and the improved units will be more effective, more lethal, more survivable, but we don't know how much. But I don't think that we ought to go in and say we are not going to change; this is just for command and control at the higher units because I think that the whole fundamental way of how we fight will change. We don't know what we don't know.

LTC Gonzolez: But sir, doesn't that fall back to the reason why we are doing this. Are we doing it to make the same sized unit more lethal or are we doing it to have the same lethality in a smaller unit.

BG Ohle: Why can't we do both. Make a smaller and more lethal.

LTC Greer: Or you can keep the same size and be more lethal. In other words, we had eighteen divisions and now we have ten divisions. But if we can make the ten divisions we have as lethal as the eighteen divisions we used to have, that to me would be nirvana. Instead of taking the ten we have and make them even smaller so we are only as good as ten. We still end up with less than we started out with.

BG Ohle: I think that you have to go to the National Strategy. I mean that is where, what is the mission? How lethal do you want it? If you wanted eighteen divisions, yea, stay with ten and digitize it and we'll get to eighteen. But I think that we have got to come off of that to some lower number, I don't know what it is, and say really we want a force about the size of ten or twelve or fourteen divisions and then experiment what will digitization do. We are going to have to be smaller but yet we want to be more lethal. So it might be somewhat less but equal to the firepower and lethality that we have now. So I think we can enhance our lethality and still reduce.

LTC Gonzolez: Unfortunately we are still tied back tot he resource constraints.

MG Rigby: And we always will be. As a matter of fact, if we let any of our experimentation documentation drive us towards the term, "with a smaller force we can do as well as a larger force...", believe me, we are going to take a cut in manpower. We don't want to do that. We are still facing a 20,000 force structure cut in the 99-00 time frame.

COL Baribeau: I think one of the interesting things that I have noticed, a lot of interesting discussions about how the staffs will be organized, but the thing the G6-J6 folks running the Internet and all that sort of thing have thrown some wrenches into the works because when we came out of the last signal center assessment they reduced the number of wiremen they had. Actually the signal force was identified as going down. As soon as we introduced all this automation and digitization they started looking around and everybody started asking themselves who is going to help us to make sure the LANs get instituted properly, that they are maintained. Who is going to help with keeping these servers up and make sure that the applications are available and who is going to do all this stuff in these new digitized command posts. What we saw was about a 30 man increase per division in signal resources. Same thing has happened in the intel world. Now you would think that with better digitization and the ability to distribute very, very important high-level information, imagery etc. that the requirement for people would go down. What they have done is they have said that they have to be in more places. So I think that what's going to happen is, and General Miller says this quite often, initially we will see growth as we manage the complexity of all this and then at some point in time in the future we will realize that we know how to do this now and that we don't require three of four people helping us to do something that we now can handle because we have become computer literate and it has become the way of doing business. Organizations, I think, and we have seen it in Task Force XXI, are growing a little bit but I think ultimately they will shrink back down. How our staffs are organized 1's, 2's, 3's and 4's,

some interesting things going on out there on e-mail. I mean we have people in the logistics community questioning whether they need 1's and 4's anymore. Comment as we were walking in this room was, "If we are going to have a command post information center and we want it to be commander focused and not focused on the Battlefield Operating Systems, we need to have those guys work for the boss and not for the Commander of Troops." For example, for Artillery you have your FSE in the TOC, maybe he has to work for the commander. I agree with BG Ohle, we don't know yet what we don't know. I think what we have to do is be flexible enough when we identify something that works, we have to willing to stand up, regardless of our parochial interests, and say "That sounds like a good idea, I think that we ought to do that." And it is going to change, I think, in a lot of stuff.

LTC Marin: One of the problems that we also have is trying to assessing the impact of some of these changes. Traditionally with weapons systems if we wanted to assess the impact of a new tank or new infantry system we have accepted models and combat simulations that we have run for literally years and we have measures of effectiveness we can use. But now we give a commander better information in which to make a decision and how do we assess the impact of that before we go to a battle before or before we go to the National Training Center. There is a whole theory that has to be developed in order to now compete with the more physical components which we are pretty good at assessing.

BG Ohle: But don't you think down the line we will have simulations and we will be able to simulate that. I think so.

LTC Marin: I think people are working on it, sir. But decisions are being made now and need to be made now and we don't have that capability.

COL Baribeau: Boy, you are really getting off into deep water because you can have some commanders who can give 90% of the solution and they still wouldn't want to make the decision.

LTC Marin: But sir, I counter that. We can give a soldier a tank that has the most lethal capabilities and he still may not want to fire like Sam Marshall used to come up with. We have come to grips on how to simulate that in the modeling environment and get realistic data on a computer before we have to design this prototype. And so the situation you just described, yea, we can hopefully come to grips with that in the simulation world but I think we need to do it.

COL Baribeau: I am surprised that the term has not come up: Battlefield Visualization. Everybody throws it around like a baseball. What Battlefield Visualization is is a conglomeration of a lot of different things such as simulation, man machine interface, terrain visualization piece. I mean it is made up of several parts but the bottom line is that what you want to do is you want to present information provide tools for a commander so I guess any given two or three commanders would be able to see their way

to making a decision and understand their future state and that would get them to that point to make the decision and if you could ever simulate how all those come together in the mind of that commander you would have something very, very powerful. Boy, there are a lot of moving parts there. I mean that would be one heck of a model. But, uh, I wouldn't tell you not to do it. A lot of good AI stuff out there. It might work.

MAJ Agoglia: That would be part of the leader development piece, sir, making decisions under uncertainty. I mean that is what we are always trained to do. What we are trying to do with this technology is to reduce the uncertainty. If that guy can operate with 90% certainty and can't make a decision, doesn't deserve to be a leader. We need to move him on as part of the leader development process. That needs to be what we develop is people that can operate under uncertainty. Because if you can't then you don't belong in this environment. You got to trust and then develop a trust in the technology that it is giving you the right data and how do we develop that trust..

BG Ohle: See that gets into leader development. We can develop simulations that can train leaders to be able to operate in this environment, I think. You know we have got virtual reality, we can put them in the virtual battlefield that they can have sentry inputs they can have a relative common picture we can put them through simulated combat unlike they have never been in, harder perhaps than the NTC. I mean that is doable, we are not there yet. When I came out of Vietnam and went to the Advance Course they had a simulation, probably some of you have seen it, where, some of you have seen it, where they had a mock-up of a helicopter sitting over a board, did you ever see that, and you would sit up there and they would put a headset on and then they would call in all types of missions and you had to, over the nets, command and control this Task Force from the helicopter. Just picture yourself in a bunker, or whatever it is, wrapped in virtual reality with a relative common picture put that same simulation in the 21st Century and we can train commanders to be more proficient. Now you are always going to have the commander that can never get it and that is the kind you weed out and you say, "hey you need to be something else." But I think we will have better simulations that will enable to go out and...

LTC McGinnis: Sir, if I could...I think that leads right into the notion that maybe the time has come to develop a battle command track. That people at certain points in their careers certain types of people, they have that knack, they have demonstrated that ability. You give them those opportunities to experience that battle command environment without putting themselves, their forces or their equipment at risk, so that when that battle commander assumes command, he or she is ready to go tomorrow, the flag is passed they are ready to go. But it also speaks to the efficiencies you were talking about earlier. If you have the ability to tailor the commanders information needs and everyone of those commanders need are different. When I was here last year we surveyed umpteen battalion, brigade commanders, we got ahold of one Corps and six Division Commanders, currently serving, got their CCIR for real world operations. We got about 200 different pieces of critical information. We then mapped, we did a historical survey of things that had been done, and even though different words are used to describe the

same thing, it turns out that a lot of these things are common. They call them different things they look differently but once you map them back to a common set of piece of information you get some categories that start to emerge that create that relative common picture for you . But what you want to do regardless of how much commonality there is, you want to still allow the commander to tailor all that to the needs of the commander ahead of time so that when the commander walks in they can build that in a way that is very intuitive to them and you can have the staff work with them ahead of time so that when that staff walks in and they are prepared to take over as a team, not as individuals that then have to spend six months in a degraded mode to get back to where they were before the change of command. The other thing you can do is on the equipment and the SOP side, Jim as you have point out for years now, and that every interview that I did and the other guys that worked for me did, it that SOPs are key to success for small unit operations. When you salami slice folks together and you tell them to go do it now, mistakes are made because they don't understand what that means. So you have to now start to build and tailor those forces ahead of time, tailor the equipment to the geographical and operation that they are going to be confronted by most often and again look at the strategic assessment the strategic needs of the nation. If you see on the horizon a lot of Central Europe heavy force stuff, then you tailor your force that way. Otherwise you tailor it another was. And then you can save on your equipment your fielding plan becomes tailored to how you see those types of operations unfolding.

COL Hoffman: I would argue that that is a very intuitively appealing view of the world. If all the Army consisted of was warfighters, then I would say let's go for it. Now I am speaking as a personnelist. Now I thought I would never ever say this, a personnelist, gak. Anyway, we have been looking at this in the OPMS Study Group for a long time for about a year now. Part of our problem right now is developing an officer corps with a full range of capabilities that run across the entire spectrum of skills that we need in the Army. A fundamental recognition that we came to, we are a little slower than the rest of the world, we're personnel guys, is that there is a real symbiosis between the TDA world and the TOE world. The TOE world feeds the TDA world which in turn feeds back into the TOE world again. You can't run the TDA world without warriors over there and vice versa. So you have to have enough of those kinds of guys who can go back and forth and fill the Army's need. For example, I am an infantryman. The pyramid for infantryman looks kinda like a spire at the rank that I am in right now for combat infantryman jobs. The majority of infantryman who are Colonel and Lieutenant Colonels are doing TDA type jobs. That is where the preponderance of our field grade officer corps is. If you keep that in mind then you want to have an officership that can expand to fill warfighting skills, that can fill all these other specialty functional areas like ORSA, like many of you guys I am sure are in here, 48's, 45's, 39's all those kinds of people who do these specialty things for us besides being warriors then you have got to have a system that takes your guys back and forth. And I would argue that this kind of system, while it appeals to me as a warrior, as a personnelist, it subverts the larger view of system as a whole. So you have got to be very careful when you start making a recommendation for that sort of suggestion. What we found is some of the things that appeared to be intuitively the right thing to do, intuitively simple in fact work against the system. They

acrually undermine the purposes. For example, some people well were going to protect our Lieutenant Colonels, we'll make more command opportunities. What we found is that in fact what does is dilutes the population hides who the stars are and what we found is we have a lot of people who are Lieutenant Colonel get passed over for Colonel. Why not identify who your real stud muffins are out there give them tried and true battalion commands and brigade commands and ensure that they get promoted. All I am saying is that lets keep the wide in perspective. Whenever we get in forums like this we always focus on the TOE warfighting side and we forget the rest of this Army out there which we call the TDA Army and it is essential for our existence. There is a symbiotic relationship...

BG Ohle: Everybody gonna be involved in information management. Information is the key to the future. So whether you're a warrior or a warfighter or you're a research person, you have got to understand the basic manipulation of information and how to do it as it fits to your own function. I like your description of tailorability. I think it is adaptability. But it fits right in with what Steve was saying in that where were going and he said it in his brief is to this ABCS that paints a common relative picture. We have got to have the systems that enable you to share information but unless we make this information tailorable to the commander, we are going to be stuck. And the way we do that, I think, is, and we are experimenting with this out at Leavenworth, and I just want to show you this so you all know that we are not just building a common relative picture. We have created a CIC, and the name is not important Combat Information Center, it is sorta like the Navy ship and that is where that came up, we had different names. So what we are trying to do is create a cell in an organization that is responsible for the conversion of information from vertical to horizontal. From the stove pipes to a relative common picture of a maneuver control system that enables that information to be tailorable to the needs and the level of the person. So coming in here we have all the ATIC systems and then you can set up your cell how ever you want it, it could be consolidated. In the future, the CIC person for intel is gonna be the G2 shop. He will be designated working for a G6, who is the information operation person. And that information comes out of the CIC and you should probably have a CIC at every level. So if you are a division commander then you have a CIC and if you are a brigade commander then you gotta have a smaller CIC or people that are designated to take this information that comes in and distributes it. Then what happens is as you distribute the information you have sort of a, I call it, a virtual division. You can have many rooms. So what happens with information all information is not pertinent to everybody. So this ides of painting a common relative picture doesn't get it. I got this idea from the force projection TOC. They put this TOC together and they had differenct cells and there wasn't an integrator. So they created a battle captain. And this Battle Captain is able to switch back and forth. But I think that is not only the switching function it is the distributing function that is required. So this cell here got to be able to take this information and distribute it, say like this is the 1, 2, 3, 4. So this guy says OK based on the CCIR of the commander, we've got to get this type of information to all the 3's so it goes to that room in the building and it needs to go to the commanders at every level but it doesn't need to go to the 2's at all. So in other words you tailor the common relative picture to the needs of the commander

based on his CCIR. We are not there yet, we're working with this at Leavenworth with this Prairie Warrior. To see how we can take and distribute, change the information from the vertical, the integration to the synchronization as you try to run your units. It is a software problem but you've got to realize that the same picture isn't...

COL Semmens: But the key is, sir, the guy on the other end has got to, even though *routinely* he gets a given box, has got to have the capability to build other boxes and that is the challenge.

BG Ohle: Exactly. And then there's different types of information. You know I call them "tiers of information". There is some standard information that you don't have to set a filter or a gate or anything and you don't have to put a man in the loop. And that's going to go to whatever rooms you want it to in this building just because you write the software that way. Then a tier 2 and a tier 3 become more specific and I would say tier 2 focuses specifically on the CCIR. To give, to paint the picture to the level, to the function, that you need the way you need it. And you create this tier 2 level information precisely based on that and that is why you absolutely have to have a man in the loop. And then tier 3, and I am open to any debate on tiers, tier 3 is a situational emergency type. You know "Incoming red air". OK, when it happens that way, it's got to go it is not routine information but its exception only. So, there is so much to do and we are just trying to now paint this system so that we can paint a common relative picture and you would think that would be really easy that you could take all these ATIC systems, line them up and be able to manipulate the data, because they are just digits, and it could happen, it's hard. And you've got all kind of parochial views to break. I mean everybody has got their own focus, like the Artilleryman , they don't want to let fires be called for or planned in a maneuver control system. They developed AFATAD. So I mean, why not do it there. So should we put this an AFATADs box down here in this cell along with a maneuver control system or could we do the same thing like Steve said, suggested in there, on one common system. I think we have got to migrate to one common system and get out of these stovepipe systems. So, I mean, we are having a hard time breaking that, and how to you get that PM or PEO to adapt their system to be compatible, future compatible with maneuver control systems.

AFTERNOON SESSION

LTC Hutchison: ...And the digitized force gives that ability to see the battlefield and know what to do to every commander at every level. Really, what's difference between the digitized commander and the Patton is the will to execute what he believes the right thing to do. That's been suggested. Does a digitized force make, I don't know, a average commander into a Patton? Or two-thirds of a Patton?

LTC Greer: Only if you believe that seeing something is the same as understanding it. They are entirely different.

LTC Hutchison: Absolutely, they are. Like I said Patton's genius is seeing the battlefield, knowing what to do which comes from the understanding. I guess not, you can know what to do without understanding. Seeing the battlefield, knowing what to do and the will to execute. Digitization provides you with a tremendous inroad into two of those. So, is every commander now two-thirds of a Patton.

LTC Greer: It doesn't even let you see, it's one-sixth of that paradigm at this point. Not two-thirds of it, but one sixth of it. It provides some information about the battlefield which is entirely different than seeing the battlefield. That goes back to the battlefield visualization point that COL Baribeau made earlier. Seeing something is worthless. OK, there's five enemy battalions out there and there's three friendly battalions over here. That's nothing. That's just some information. Seeing it, visualizing it, understanding it that's what's important. And that is all I said, one-sixth not two-thirds.

LTC Hutchison: So, now let me turn the argument around. Does that mean that need more Pattons? That it's now harder to do that than in Patton's age?

LTC Greer: I don't know if it is harder or easier. I know that it is different. You said see the battlefield, know what to do about it and then have the will to act. But what digitization gives you is one-half of what you need to see the battlefield. It gives you the information about the battlefield but you still get to be able to *assimilate* that information and *understand* that information before you can move on to the next point. So my point was that it is one-sixth.

LTC Shattuck: But it has to be done within the concept of what your particular piece of the battlefield is because you'll have *all* of this and this is your piece here and you have got to be able to sort out what is irrelevant to your particular mission and then, as he says, to focus on that and derive your actions on that as opposed to the rest of the stuff that is out there and could be interesting to you, but is not necessarily relevant to your mission.

COL Baribeau: I'll give you a real time issue we've got right now. In the client server architecture for MCS it is the only battlefield systems where anyone can change the data base in, anyone can change the database in. We designed it that way to be able to build the common picture, not realizing that we were actually allowing an operator in an artillery track to be able to go in and move stuff around. All of the other BFAs when they write to the database are read only. And so, we have got situation where we got to decide now do we want to take away artificially before we have experienced the exercise that capability to change databases or do we want to see if we can deal with it with TTP. Kinda want to give them more I think initially and the figure out how to neck it down and limit the really big problems rather than go in and designing all kinds of firewalls that prevent you from using, from the system being as flexible as you would like to be. Same kind of thing here. A division commander could in fact go to the database of the battalion. Sure, and there is nothing to prevent him from doing so. The question is, why in the devil would he want to do that. It is a real problem. Digitial system…

MAJ Phelan: Isn't that overstepping kinda what that division commander needs to be doing at that point also?

MG Rigby: If he has got the time to do that, he is not doing anything.

BG Ohle: Which ATIC system?

COL Baribeau: MCS. Yes, sir. The baseline version. In the client-server architecture, if you are in an artillery you can go in and change the friendly ground picture.

BG Ohle: Can they change AFATADs?

COL Baribeau: AFATADs if it goes in and lays down, no one can go in and change the lay down that the artillery commander did. But you could change the hard pieces of the relative common picture. We are dealing with it right now. We are trying to figure out which way is the right way to go.

MAJ Phelan: Sir, then what's the link back into AFATADs then from MCS. The maneuver commander draws out in his graphics and we may two separate databases now representing what is on the field.

COL Baribeau: With the artillery commander serves three of four different pieces. His overlay, his priority target list and some other things and that comes into MCS where MCS is like anything else, a client. When MCS builds the relative common picture using certain parts of information provided from other people then they send that back., everyone else is a client for the common picture. That picture can be changed by anyone right now. Just to give you that flexibility to be able to manipulate the data. So we have got some dilemmas.

BG Ohle: The artilleryman have a very parochial view of all this. They only want to deal with AFATADs. They don't want to have their data displayed over MCS. I mean there's a big issue will we as we develop the digitized battlefield, put some of these ATIC systems out of business? And we might if we have this common database.

MAJ Phelan: Then we begin chipping away at empires out there. People that think their stovepipe systems are going to be redundant. No one is going to want to lose anything and then we hit the political spectrum of things.

MG Rigby: That is why we are having problem making headway right now. These stovepipes. Not only do they have their defenders within the Army. Industry, and I hate to say that, have a proprietary interest in making those stovepipe live on because their systems have a market niche there.

COL Baribeau. And the argument is is that we have end to end weapons systems therefore we need end to end command and control. And they need the command and control for the end to end weapon systems but when they come in to a battalion TOC, that's no longer required to fire artillery or to shoot down airplanes. And that is the point where the common applications need to reside. I don't think anyone wants to take the ability for an artilleryman to punch in at an observer controller location data and not go to the gun. We want them to continue to make that the best possible in the entire world. But when it's actions the battalion commander take to command and control his unit, that is very similar to what an Air Defense Commander does or a maneuver commander does. And that is where we need to bring the commonality together. And that is where the common applications versus the unique applications come together. In fact, if you look at the objective ABCS, it says that it is a system. And there are no systems anymore.

BG Ohle: We have a problem in Prairie Warrior. We tried to develop this Combat Information Center and have all these ATIC systems be integrated by this one cell to include artillery and intelligence. But the intelligence branch school and the artillery branch school commandants came to me and said, "Hey, listen, we can't do this." What this means is that down in a TOC all you have is a Phoenix station. You don't have an ASAS or an AFATADs or one of their types of system. So they said let us do an experiment. Let us in some brigades put in their branch box along with the MCS Phoenix and the other ones we will just try to do with Phoenix. And we are going to have an experiment to see if we can command and control the units equally as well without having the separate branch boxes down there. I think the answer is yes. We, in the Simex we did for Artillery, we ran 18 fire missions in Phoenix before they ran any in the AFATADs. Just because it was there and we had worked the process so that you could do the call for fires through the Phoenix and it would go right to the gun. Now what the fire support officer has a problem doing is doing his fire support planning. We have got to work that out. Do you need that computer box right there or can we adapt the Phoenix box to be able to accommodate that . But our fire missions we working terrific. So here you have a proponency issue. I mean how much money do we put into Phoenix?

COL Baribeau: It is. And I will tell you that the other folks who are going through this right now are the intel community. You have the ability to send imagery just like that.

LTC Greer: But there is a difference, though, sir, and that is that the Intel guy for years and years and years got an A+ if he could say where the enemy is. Anybody can do that with digitization. Anybody. So now the Intel guy is -- what does it mean? And so that is good. We want people who have the ability to step aside and are trained and get the simulated information and say, okay, boss, this is what it means; this is what he's going to do, this is what we ought to do. That's a great thing. In field artillery it's a little different. For years and years and years we had all these guys who were nothing but a set of eyes. Well, now everybody is a set of eyes. Everybody is a set of eyes digitally linked. And most of the coordination is done automated. So the question is what of that

structure do you have to attain in order to have the checks and balances in there? There's two key checks that you still need to have in there is clearing the fires and making sure that you don't overload the system and you have a positive means of saying this is where I do want to shoot and this is where I don't want to shoot. So, I think it will change the character or change in size. It will change a little bit in character.

BG Lamkin: I think that field artillery does want to put steel on target. And sometimes you lose track of this, okay, the importance of that mission when you've got all this other digitization stuff going on. What I noticed with my young guys that I trying to train up in the old TACFIRE system, as soon as they got those gismos in front of them they sort of forgot about the most important part is putting steel on target. And I would say now that field artillery would be very much concerned about a system that's going to replace what they have because hopefully by now they've at least gotten back to the point where they're prioritizing stuff instead of just getting fire missions taken care of. And I'm not sure that Infantry mentality can really ...

LTC Greer: In Task Force XXI right now will be about seventy sets of eyes that are digitally linked. Now, out of those 70 sets of eyes only about 15 have field artillery brass on.

BG Lamkin: That are digitally linked to the guns?

LTC Greer: That are digitally linked straight to the guns. So that's a scary thing.

BG Lamkin: It is kind of scary when you think about what has to happen before somebody pulls the trigger or jerks a lanyard.

LTC Greer: That's the point I'm making. That's why the checks and balances...

COL Baribeau: There's quite a set of parameters that have to met prior to * even though it is digital. They built in some pretty good checks...

MAJ McFadden: Within that, sir, -- I mean of field artillery. I mean even when they're digitizing right now. So there's nothing -- you can't lose that sense of control of the artillery leadership being able to approve the fires. It's still there. I mean assuming that mission down to a gun is because somebody has already seen the information or determined the status of the fire link and can view the information that is being passed through. That's what you really want to deal with.

BG Lamkin: Seventy-five simultaneous transmissions and somebody's has got to decide whose going to take care of what mission and digitization. Your system is going to have to take care of it.

MAJ McFadden: Yes, sir. We will never replace the man in the loop. You still have the battalion TACFIRE out there and the battalion FDO that still can stop and you know

monitor all those missions in the Battalion FDC. I mean the missions, even though it goes down to that direct gun, I don't think that you're gonna get that guy just pulling that lanyard just because he gets he now gets his data you know his firing data, and it happens to be...

LTC Hutchison: On the screen that I've got up front -- Issue: How the army trains it's commanders -- one comment says in essence you train them in your doctrine. Now, what we're talking about is a different way to get information, maybe a better way to get information. That's hardware/software stuff that is different, though. Maybe we train commanders in that, but maybe not. What we need is to have them use the products of that hardware/software so in essence, you know, if I read this comment one way it says we don't need to train our commanders very much differently than we do now. We train them in the doctrine. The doctrine may change a little bit because we are using the patterns of operation so we want to train them this way. But we don't have to train them differently. We just train them to be commanders to fight our doctrine. Is that a valid interpretation? Does that make sense? The commanders need to be vaguely familiar with this digitization stuff in order to be effective as commanders.

LTC Shattuck: Depends on the force structure. I remember when MCS came into the picture it was suppose to be that division level captains and majors sitting down at the machines. And at that time captains and majors were scared to death of the thing so we sat SP4's and PFC's down at the machines and they made it work fine. But it was not -- all they were doing was record keeping. They were not making command decisions or staff level decisions on those machines. And potentially the same thing could happen to digitization where we'd get -- well, now maybe we'd have captains and majors sitting down at the machines, but they're not necessarily the decision makers, you know, at the corps level and so you still have the same issue and purpose.

LTC Hutchison: See, the commander needs to know how to effectively shape the battle space, but it doesn't mean he has to shape it himself. You know, he gives the direction. I want this type of information, etc. But he has to know how to shape the battle space, he doesn't have to actually do it.

LTC Greer: That's the difference between education and training. The education being a broad thing when you have to put commanders in training being more a unit METT-T specific type thing . But I see no reason for a division commander to necessarily be able to get in and do anything with the hardware/software package. But he has to be educated on that stuff right there. And he has to be educated on how to employ all of the capabilities within distribution. One of those capabilities is in fact digitization, whatever the piece parts he ends up with.

LTC Hutchison: He has got to know the capabilities in order to be able to do that.

LTC Greer: Right. He only has to have a rudimentary training on the nuts and bolts. Now, however, stick him in a C2V and he's one of only five people in there and a couple

of them something happens to, he better be able to jump down on that terminal and pull that stuff out when he has to. So is there training that has to be done for the commander? Absolutely. I think what we've got to do is attack and reach excellence on the education side of it first and then we police up the battlefield on the specifics of the training..

COL Hoffman: I'd like to tack on to that -- I think that's an important point. The danger going into the educational cycle with that, there's two aspects here I think you've got to look at. There's the actual cognitive skills that the users are going to us and then there's the meta-conative aspects that the senior leaders have got to have. It's a higher order. It's understanding how others use things. And there may be a third order at the strategic level. And I'm not sure we've got a grasp on that in our educational system right now. First of all, I think we have a good handle on the training and focus on how to do it with the users. Maybe an imperfect understanding at the meta-cognative level at how you control users and this optimizes skills. And I don't think we even thought about at the third order, the higher level maybe the meta-cognitive aspects of this. The point being, though, when you go into the war college, for example, where I just came out of, although it's an institution I just graduated from a couple years ago, you see officers who are very comfortable at the tactical user level or are less comfortable at the meta-cognative level, how do I employee these resources, how do I think about second order standing away, deploying things, in some sort of holistic sense and not at all comfortable at the strategic level. It takes a long time for us to build up that skill. Maybe we ought to look at starting those processes and working within an earlier level. And an aside, the computer can facilitate that but what Jim had just spoken to, is developing inductive and deductive reasoning skills that are far apart from software or hardware technology that we build. We've got to develop officers who can look at pattern and have pattern recognition. And pattern recognition is the essence of conductive reasoning. You've completed your information and you have got to draw conclusions from the information based on that and then make decisions on it. And I'm not sure we can do very much to support that in our military education system. Our civilian education system, on the other hand, will look at all of this most of us went to the Master's programs and we went fully funded, that was the essence of our civilian education. I'm not sure that we do the same thing in our military side. I think the military side needs to complement the civilian side, and that is my two cents.

Annex F
Transcripts from Closing Comments

LTC Hutchison: The major issues that we discussed in the interoperability liaison. You can see some of them there. The bottom line is that liaison teams are not necessarily the answer. They're the answer in the short term, but not the answer in the objective segment because we don't have the money or the personnel to support liaison teams to advocate units that don't -- that are not digitized. It's important to know that, though, interoperability is not technology. Technology is the enabler. Interoperability is a function of our doctrine, our TTP's, etc.

How do we **fund** the transition? We didn't really discuss a lot of strategies, but that is a significant issue. One of the comments was we're here already, but when we field it we can't really field it piecemeal and expect it to be effective. At least at levels we've got to do it all at once.

In the organization area some of these came out. The bottom line is that organizations determine what we can do and our doctrine and the technology available will drive the organizations that we're going to use to implement the digitized force. So organizations are going to optimize the effects of digitization. So it's almost premature in some sense to talk organizations because organizations that we develop now are going to be near term solutions that get us to our objective force.

This came up quite a bit. Training in an area of constrained resources. You can put any seven ideas underneath that that you want. It's hard to train leaders. It's hard to train people. It's hard to stabilize. We talked a little bit about just in time training as opposed to imbedded training that is continuous.

Some of the issues that came up in leadership is that commanders may have a tendency to micromanage. But the general consensus was that they always have, they always will. And we need to train our leaders to understand delegation of authority.

In the How to Fight Issue Area, we focused primarily at task force, although we didn't have to. And not all the comments were at task force level and that is where we chose to focus. The question was does it really change the Task Force level. And I think the understanding is that yes, it does. It will change fundamentally at the Task Force level. The commanders -- and it's not really a tool like a more powerful warhead or a faster Bradley. It is something that will fundamentally change the Task Force commander's fight. The Task Force commanders themselves will have to shape the battlespace not allowing only battlespace to be shaped by the higher level. They themselves have the capability issue.

The Readiness issue is the last one. These are the comments that came out of Readiness: Training, training, training determines readiness.

We looked at some themes that recurred. We didn't necessarily discuss these areas, but these are some of the themes that kept coming up during our discussions today. Interoperability verses connectivity. We discussed that quite a bit when we were looking at working with a non-digitized unit and applying an appliqué. Is that really interoperability or is it merely connectivity.

Leader development and training are keys to success. In fact, those two are the issues that were nominated by everybody for the afternoon discussion.

We achieved a measure of consensus, I don't have the specific issues, but the issues will be in the packet that we give you. What we looked for were consensus on show stopper issues and consensus on issues that were solved or solvable in the near term. And really those were the conclusions that we came up with.

That kind of recaps what we did this afternoon, what I think we accomplished. Was there anything that I put up on that screen that looks different from what we talked about?

(no response.)

There was a copy of the worksheets that were generated with all your comments will be given to you as a take-away packet along with a slide presentation of the overview remarks from General Rigby and General Ohle when we leave.

MG RIGBY: Well, Jim, I'd like to thank you and your staff for being such great hosts and such great facilitators in this setting to bring together some good focus on some issues that we need to start working on. Dave and I were just remarking before we sat down that we're probably sort of in phase two of digitizing the Army now. Eighteen months ago he and I were pulling our hair out on how we would actually get this thing off the ground. And we actually got the money, put together some programs both at TRADOC and in the material developer community and it's happening down at Fort Hood now. Now we're in stage two to take all the issues I think that we discussed today and assign the responsibility, execute them on the joint venture axis and my axis. This has been a valuable session to focus on those issues and get ready to move out on phase II. I really appreciate you and your staff doing that. It's always great to see a fellow '62er again.

COL KAYS: Thank-you, sir, I appreciate it.

BG OHLE: Col Kays, I appreciate, like General Rigby, the great hospitality and effort that you all put together. Dave, terrific facilitator. You can come work for me anytime.

I wasn't sure what this was going to be. But I think there was a pearl in all we did today. This probably should be the first annual or the first semi-annual meeting where we come together at West Point in this department where you have the intellectual power and the great staff to put this together. There are a lot in the Army that should have been here that weren't able to participate. And we can either bring them in or we can look to distribute some of this and you can do the comments and the voting distributed, I'm sure, and still get the information in. But I think it's very valuable to the Army because you always need an outside look into what you're doing. It's the old fox in the hen house. If you let TRADOC do it or CALL do it or somebody or ADO office you're always going to get the feedback that you want. This way it's totally independent. We bring the right people in and we get good feedback for General Reimer, for TRADOC commander, ADO and for everybody. So I think it's very valuable. I think the Supe ought to be informed that this was truly a great effort. I know the Dean was over here. And my encouragement would be to let's continue it.

I wasn't sure that Dave Ohle and Steve Baribeau were on track with the battle command, but I think it fit exactly into what you were doing. I knew General Rigby would be because that's the thrust of what we're all about in digitization. He's got the ADO axis. But when you look at what we presented and then the comments that came out, I think we were in line with what you wanted. I think we got some good feedback for our system from the interchange exchange of information that we had.

So I thank you on behalf of CAC, General Holder, General Hartzog, everybody. Really good, thanks.

Annex G
LTC Hutchison's Slides from Closing

Force XXI Symposium: Directions in Digitization

United States Military Academy

Interoperability Issue Area

- Liason officers or teams are not the answer.
- Interoperability is not technology.
- A non-digitized unit has some but not all digitized equipment.

Transition to Digitization Issue Area

- How does the Army fund transition?
- We must remember that we are already in transition.
- Must field at specific levels
  - All at once
  - Piecemeal will not work

Organization Issue Area

- Use organizations to optimize the effects of digitization.
- Organizations determine what we can do.
- Doctrine and technology will drive our organizations in the digitized force.
- Command post will become integrating centers.

Training Issue Area

- In the age of constrained resources...
- Hardware and software have a relatively short life.
  - Significant training impact.
  - Exacerbated by the turnover of personnel
- Must still train leaders in the art of war.
- Just in time training.

Leadership Issue Area

- How will the Army train its commanders?
- Micro-management will be a problem (and it will always be a problem - get over it).
- RCP must be tailored to the needs of the commander.
-

How to Fight Issue Area

- Can we achieve the same results with fewer organizations and/or systems?
- Has the process really changed at the Task Force level?
- Digitization will allow the units to disperse and concentrate more quickly.

Readiness Issue Area

- Training - Training - Training
- C-ratings

Symposium Themes

- Interoperability vs. Connectivity
- Technology will bring about change.
  - The impact of the change on C2, DTLOMS, and doctrine are not clear yet
- Leader development and training are keys to success
- Docrine for future operations needs work.

Consensus

Conclusion

Annex H
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